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A COMPARISON OF THE AS PURCHASED AND PREPARED FOOD METHODS FOR DETERMINING THE FOOD INTAKE OF HOSPITAL PATIENTS

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IN DETERMINING the amount of food consumed by large groups of individuals, two methods of calculation have been used: the one based on the food as purchased, and the other on the prepared food. Both methods have been time consuming and therefore expensive for use by institutions.

Smith, in 1929, working at the University of Chicago Clinics, devised a shorter and simpler method for estimating the average food intake and the distribution of nutrients in the diet per person per day. If this simple method yields results which agree with the standard methods generally employed, it may be recommended for use in institutions where large groups are fed. A short description of this method and the results of two surveys of the food consumed by patients at the University of Chicago Clinics, with a comparison of the as purchased and prepared food methods, are included in this paper.

A review of the literature in which a study was made of the intake of hospital patients may be of interest here in showing the variations in the methods employed. Rose (1), in 1912, made a dietary study of children in a hospital for the treatment of diseases of the bones. She determined

[1] Data on prepared food are taken from a dissertation submitted to the graduate faculty in candidacy for the degree of master of science, Department of Home Economics, University of Chicago, by Bertha J. Biltz, 1932. Received for publication, May 14, 1932.

the distribution of the nutrients in the ration by an inventory of the food materials consumed. The results estimated on the per man per day basis showed that the total intake averaged 3465 calories, with 12 per cent of the total fuel value derived from protein. No attempt was made to calculate waste, but a total loss of 20 per cent was allowed.

A study by Wilson and Rathburn (2) at the New York Municipal Sanatorium of the calorie value of food served to tuberculous patients showed an average intake of 3700 calories for men and 2750 calories for women. Fourteen per cent of the calorie intake of men was furnished by protein, 39 per cent by fat, and 47 per cent by carbohydrate. For women patients, 16 per cent of the calorie intake was furnished by protein, 41 per cent by fat, and 43 per cent by carbohydrates. The calorie value of food was determined on the prepared food basis. Plate waste was separated and deducted from the total amount served.

Hoskins (3) carried out weekly studies of the average food intake of patients in a military hospital. The general method was by invoice of food materials. The average food consumption was 3263 calories, with protein furnishing 13 per cent of the total calories, fat 35 per cent, and carbohydrate 53 per cent. The edible waste was averaged at 0.70 pounds per man per day.

Wheeler and Shalla (4), in 1926, made a nutritive analysis of food served to patients at the University of Iowa hospital. The monthly bills for the food as purchased were used as a basis for determining the amounts of food used, according to the plan elaborated by Rose (5) from Hunt's (6) scheme for the nutritive value of large quantities of food. Results showed the daily average food intake to be 399 grams of carbohydrate, 103 grams of protein, 116 grams of fat and a total calorie value of 3063. Wheeler and Shalla state that after a definite percentage was deducted for plate waste and waste in serving, the results agreed with the intake computed from prepared food. The amounts deducted for waste and the methods used in computing intake from prepared food were not reported.

Smith (7), at the University of Chicago Clinics, devised a cost accounting sheet which shows the distribution of food among the three main groups, patients, doctors and nurses, and employees. Foods were roughly grouped according to their composition of carbohydrate, protein, and fat; some extra groups were allowed in order that calcium, phosphorus, iron and vitamins might be estimated. Keeping all these factors in mind, it was possible to reduce the standard cost sheet of thirty or more items, used by many hospitals, to twenty-three groups.

TABLE 1

Showing cost distribution of food

	BEEF LIVER VEAL		MUTTON LAMB		POULTRY		PORK HAM		BACON		FISH		EGGS		CHEESE		MILK	
	Pounds	Cost	Pounds	Cost	Pounds	Cost	Pounds	Cost	Pounds	Cost	Pounds	Cost	Dozen	Cost	Pounds	Cost	Quarts	Cost
Doctors and Nurses:																		
Oct. 1–7	331	$82.23		$		$	147	$32.71	30½	$8.54		$	127	$56.95	6	$1.94	536½	$47.14
Nov. 1–7	491	114.98					111	35.15	50	14.00			105	55.05	15	3.26	36	55.89
Dec. 1–7	667⅓	158.82			92	29.44	185	43.75	29	7.69	14	4.75	126	70.10	4	1.32	560½	49.24
Employees:																		
Oct. 1–7	358¾	68.65					78	14.94	20¾	5.81	24	5.04	100	45.68	3	.96	304	26.50
Nov. 1–7	381	73.78					125	23.40	35½	9.94	60	12.50	73	37.13	7	2.29	348	29.57
Dec. 1–7	476½	89.77					171	29.17	20¾	5.49	30	7.13	38	21.76	6	1.98	320	28.00
Patients:																		
Oct. 1–7	322¾	85.57	48½	15.09	97½	31.30	17½	4.40	48	13.58	42½	12.07	111	50.09	24½	10.58	754	65.55
Nov. 1–7	429	110.86	1½	1.50	130¾	41.84	41½	16.19	45	12.60	8	2.03	155½	83.42	23½	6.48	866	77.97
Dec. 1–7	516½	131.19	20½	7.26	191	67.12	18	6.54	33½	9.06	83	24.46	156	90.46	17¾	4.29	800½	71.87

	CREAM		BUTTER		MARGARINE FAT OILS		CEREALS CEREAL PRODUCTS		CRACKERS BREAD		SUGAR		JELLY JAM SYRUP		COFFEE TEA		MISCELLANEOUS	
	Quarts	Cost	Pounds	Cost	Pounds	Cost	Pounds	Cost	Pounds	Cost	Pounds	Cost	Pounds	Cost	Pounds	Cost	Pounds	Cost
Doctors and Nurses:																		
Oct. 1–7	68½	$22.60	81½	$36.28	104	$18.67	52	$7.64	333½	$31.34	168½	$10.01	30½	$4.02	47	$14.64	27½	$3.72
Nov. 1–7	75½	25.15	73	33.58	87	15.96	65 1/16	7.91	390¾	37.49	167	10.21	16¾	3.15	31	9.30	21	3.94
Dec. 1–7	76½	25.52	74	34.04	117	21.96	147⅜	11.69	408¼	41.81	200	12.00	32	3.35	57	17.40	11½	1.50
Employees:																		
Oct. 1–7	8	2.64	50	23.00	47½	9.78	27½	3.85	210	14.00	114½	6.79	12½	1.18	24	6.32	15½	2.35
Nov. 1–7	9	2.94	55	25.40	46	9.28	49½	3.81	232	15.50	115	7.00			27	7.72	12	2.39
Dec. 1–7	12	3.96	54	24.84	34	6.52	72¾	4.43	251	17.34	101	5.92			24	6.84	6½	.45
Patients:																		
Oct. 1–7	91½	31.06	84½	39.13	69½	14.16	59½	7.90	233	18.17	131½	8.09	55½	8.58	24½	7.54	27 11/16	5.73
Nov. 1–7	102½	34.46	90 7/16	41.76	70	14.52	101	7.84	208	16.70	135	8.26	17½	1.96	27	8.84	35½	5.09
Dec. 1–7	113½	38.20	93¾	43.17	60½	12.58	106	7.47	233 9/16	20.46	187	11.10	27½	5.75	29½	9.44	17	1.95

	POTATOES		FRESH VEGETABLES		OTHER VEGETABLES		FRESH FRUITS		OTHER FRUITS		WEEKLY COST	CENSUS NUMBER OF MEALS	COST PER MEAL	COST PER DAY
	Pounds	Cost	Pounds	Cost	Pounds	Cost	Pounds	Cost	Pounds	Cost				
Doctors and Nurses:														
Oct. 1–7	640	$22.60	587	$35.76	28 1/16	$4.48	358½	$30.57	65½	$10.91	$482.75	2,609	$0.192	$0.576
Nov. 1–7	980	33.31	688¾	31.03	8⅜	1.26	399	27.32	62 7/16	10.34	528.29	2,844	0.19	0.57
Dec. 1–7	390	11.76	634	37.99	128 7/16	14.53	578	40.76	97 7/16	16.16	655.58	3,131	0.213	0.639
Employees:														
Oct. 1–7	580	20.33	248	8.90	120⅜	4.33	36	3.10	25½	2.66	276.81	1,669	0.173	0.519
Nov. 1–7	610	20.83	189	7.22	66	5.73	35	2.76	13 13/16	2.89	301.98	1,746	0.175	0.525
Dec. 1–7	325	10.41	160	6.91	195 3/16	17.46	15	1.50	41¼	5.42	295.30	1,719	0.177	0.531
Patients:														
Oct. 1–7	550	18.52	616½	34.70	221½	29.90	810¾	64.38	202¾	32.89	608.98	2,694	0.233	0.699
Nov. 1–7	750	20.87	1329½*	66.20	367 3/16	37.45	793¼	63.99	274 7/16	44.65	725.48	2,700	0.271	0.813
Dec. 1–7	205	6.18	991	62.58	279¾	27.71	501	45.47	269 13/16	45.76	750.07	2,688	0.285	0.855

* This quantity (7 days) may represent some "hold over."

This lessened the work in the bookkeeping department materially. Food requisitions when completed indicated the weight, unit cost, and distribution of each article ordered. Items from these requisitions for a period of seven days were posted on a work sheet, the totals then transferred to the cost accounting sheet for the month. Following this method, a tentative food cost report was available every seven days, as well as an approximate amount of all nutrients supplied. Table 1 shows this cost distribution for the first week of the last quarter of 1930. The method of determining food value per patient per day from this distribution sheet is used by Smith (8) as follows:

> Data necessary to calculate the average daily intake per person per day over a seven day period are found on the cost distribution sheet. The food groups on this sheet have a standard composition which can be estimated with a reasonable degree of accuracy for qualitative calculation. The standard quantitative diet sheet given in Table 2, as used in this clinic, makes a suitable work sheet for this calculation, and it also lists the kinds of food used per person per day in a convenient way for comparing this intake with the foundation diet (9) used as a basis for menu planning. This comparison shows that the kinds of foods used on the foundation diet are all included in the patient's food intake but in increased amounts. For this reason an estimation of the mineral content of the average intake per day has not been made. To avoid lengthy discussion the reader is referred to Table 2 for the standards used in these calculations.

It is interesting to compare the results for this simple method with other studies made on the food as purchased basis. The average of two weeks showed that 2850 calories were consumed per patient per day. Of this amount 272 grams were supplied by carbohydrate, 97 grams by protein and 153 grams by fat. An allowance of 25 per cent was made in this calculation for storage loss, kitchen waste, plate waste and food leakage.

Very little work has been reported on the plate waste occurring in hospitals. Murlin and Hildebrandt (10), in a study on the average food consumption in the training camps of the United States Army, found an average of 7 per cent edible waste. The method of determining waste was not described. Pearl (11) reports that from a national point of view it seems probable that 5 per cent of the protein is lost in edible wastage, 25 per cent of the fat, and 20 per cent of the carbohydrate. A study made at Vassar College (12) showed that 26 per cent of the food as purchased was waste, 10.6 per cent being edible and 15.6 per cent inedible. During the World War, Kuczynski (13) made a survey of the changes in the German diet, and on the basis of estimates only concluded that waste

TABLE 2

FORM NO. 818

QUANTITATIVE DIET ORDER

No. _____ Name Average daily intake per patient for Oct. 1-7, Nov. 1-7 (14 days) Date _____ Unit No. _____

Carbohydrates _____ Protein _____ Fat _____ Calories _____ Sugar Value _____ Division _____

FOOD	Breakfast	Dinner	Supper	Total Grams	GRAMS Carbohydrate	GRAMS Protein	GRAMS Fat	REMARKS
Vegetables, 5 per cent "all fresh vegetables" A.P.				431	13	4		Average for Oct. 1-7 and Dec. 1-7.
Fruit, 5 per cent								
Vegetables, 10 per cent "all other vegetables" A.P.				157	6	2		
Fruit, 10 per cent "all fresh fruits" A.P.				428	39	4		
Vegetables and Fruit, 15 per cent								
Vegetables and Fruit, 20 per cent all "other fruits"				127	25	3		
Potatoes A.P. Raw				347	49	7		
Butter				47	0	0	40	
Bacon A.P. Smoked				25	0	3	15	
Eggs				148	0	11	11	
Meat (lean) & chicken A.P. Raw weight				275		41	41	
Cream, 20 per cent				103	5	3	19	
~~Cream, 40 per cent~~ Jelly				19	15			
Margarine, fats & oils ~~Mayonnaise with Salad oil~~				37	0	0	31	
Milk				884	44	27	35	
Bread (white)				118	63	11	2	
Cereal (dry) average				43	34	4	2	
Sugar				70	70			
Ham E.P. Smoked				18		3	3	
Fish E.P. Raw weight				14		3		
Cheese (American)				13		4	5	

FOOD VALUE OF THE DIET		Total Grams	383	129	204
Total Calories of Carbo.	Equals 1452	Calories per Gm.	4	4	9
Total Calories of Prot.	Equals 516		1452	516	1836
Total Calories of Fat	Equals 1836				
Total Calories	Equals 3804*				

*Waste factor(25%)not applied.

~~Ordinary articles. Allow tea, coffee, water, salt, pepper, etc., as desired with reasonable restrictions, and, if ordered, also saccharin to be sent daily. Give no special instruction unless not accustomed food substitutes unless ordered.~~

Signed _____

was brought down to as low as 8 per cent, and that this loss was practically unavoidable.

A description of the methods employed in this study should include the

organization of the nutrition work at the University of Chicago Clinics, as shown in Figure 1. Food, for patients, classified into general, light and soft diets, is prepared in the general kitchen. Diets that cannot be prepared as modifications of the house diets are prepared in the central diet kitchen. A foundation diet calculated to meet the requirements for an adequate diet (14) is used as a basis for menu planning, and is given in Table 3. Dietitians are in charge of the nutrition work on the hospital divisions. On the medical divisions, individual menu slips are made daily for each patient. A record of all food refused by the patient is also kept. With these data it is possible at any time to calculate the daily intake of the individual. Accurate records are kept by the division

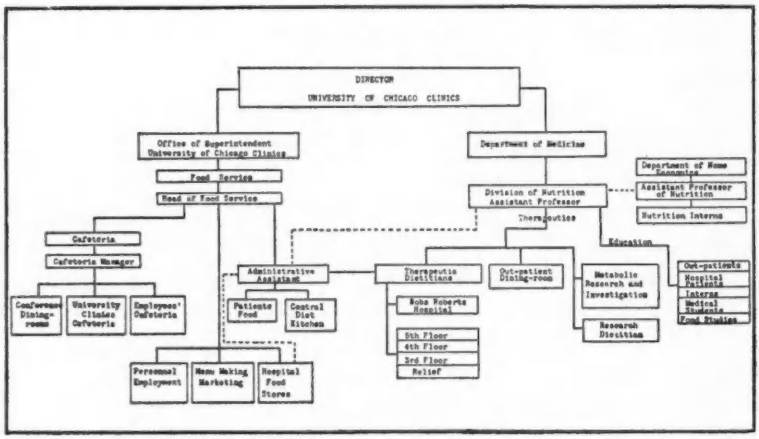

FIG. 1. ORGANIZATION CHART OF PERSONNEL IN THE NUTRITION SERVICE

dietitians of the kind and number of diets served daily. Grouping these diets roughly according to the standard diets in use in this clinic, such as liquid, high calorie, etc., calculations can be made for the average food intake. This work as shown in Table 4 is an average only, and does not include extra food served at the patient's request or adjustments made for individual requirement.

The data for this study on the prepared food basis were collected after a two weeks preliminary period. Individual servings of the various foods were weighed to obtain an average serving. All recipes used were calculated (15) for carbohydrate, protein, fat, and total calories per single portion. A record sheet was prepared to list the portions of each food served

TABLE 3

*The foundation diet**

FOOD	TOTAL	CARBO-HYDRATE	PROTEIN	FAT	CALCIUM	PHOS-PHORUS	IRON
	grams	*grams*	*grams*	*grams*	*grams*	*grams*	*grams*
Milk	500	25	15	20	0.6000	0.4650	0.0012
Egg, one	50		6	6	0.0335	0.0900	0.0015
Meat, lean	50		13	8	0.0072	0.1347	0.0018
Tomato	200	6	2		0.0220	0.0520	0.0008
Cabbage	200	6	2		0.0900	0.0580	0.0022
Orange	100	10	1		0.0450	0.0210	0.0002
Peach, canned	100	20	1		0.0144	0.0216	0.0002
Potato	200	40	4		0.0280	0.1160	0.0026
Bread, white	60	32	5	1	0.0162	0.0558	0.0005
Oatmeal	20	16	2	1	0.0138	0.0784	0.0007
Total		155	51	36	0.8701	1.0925	0.0117

* The foundation as calculated contains approximately 50 grams of protein and 1150 calories. Foods are added to the foundation diet to fill prescriptions for individual use. The protein is adequate but not excessive for the average individual. If a higher protein is desired protein may be added. The fruits and vegetables recommended provide bulk to avoid hunger, and residue to prevent constipation. Mineral salts and vitamins are furnished in abundance. The cereal, bread and potato allowed furnish an inexpensive source of fuel and act as fillers, thus there is less desire for excessive amounts of concentrated foods.

TABLE 4

*Average food intake per patient per day as calculated from standard diets**

DIETS	NUMBER SERVED		AVERAGE INTAKE PER GROUP			
	First week	Second week	Calories	C	P	F
Group I	4		1,306	94	30	90
Group II	1	3	1,527	88	35	115
Group III	110	138	1,650	205	50	70
Group IV	66	89	1,870	215	50	90
Group V	6	3	1,950	190	50	110
Group VI	28	14	2,026	74	50	170
Group VII	101	102	2,080	230	65	100
Group VIII	7	3	2,460	150	60	180
Group IX	456	506	2,545	285	70	125
Group X	26	19	3,095	330	50	175
Group XI	34	42	3,130	330	70	170
Average per day first week	120		2,329	256	63	117
Average per day second week	131		2,314	258	64	114

* This does not allow for extra food used in adjusting the diet to the individual, or for additional food served at the patient's or physician's request.

together with the plate waste. At the beginning of the period an inventory was made of all foods on hand in the division serving rooms. All daily requisitions for staples from the storeroom during the period were added to the inventory. Deducting the amount of food on hand at the end of the period gave the quantity of each supplied during the period. The plate waste as returned on the patients' trays was recorded in average portions. All between-meal feedings refused by patients were returned to the serving rooms and recorded as waste by the dietitians. During this time a record was kept of the number of trays served each meal so that the actual number of meals per day might be determined rather than the number of patient days as shown on the hospital census.

TABLE 5

Average food intake per patient per day on prepared food basis

	NUTRIENTS	SUPPLIED	WASTED		CONSUMED	
			Amount	Per cent	Amount	Per cent distribution of calories
October 22 to 29	Calories	3,446	406	12	3,040	
	Carbohydrate, grams	377	47	12	330	43
	Protein, grams	102	14	14	88	12
	Fat, grams	170	18	11	152	45
October 29 to November 5	Calories	3,382	377	10	3,005	
	Carbohydrate, grams	371	44	12	327	44
	Protein, grams	101	12	12	89	12
	Fat, grams	166	17	10	149	44
Average	Calories	3,429	398	12	3,031	
	Carbohydrate, grams	375	46	12	329	43
	Protein, grams	102	13	13	89	12
	Fat, grams	169	18	11	151	45

As can be seen in Table 5, the intake per patient per day, as estimated from prepared food, is practically constant for each of the two weekly periods and agrees favourably in average calories with those of the patients in the New York Tubercular Sanatorium (2) which was also estimated from prepared food. The percentage distribution of protein and carbohydrate in the diet agrees with the usual standards (16), carbohydrate furnishing approximately 50 per cent and protein 12 to 15 per cent of the calorie intake. There was a uniformity of plate waste throughout both periods with an average of 12 per cent. This agrees with the figures determined by the Vassar study (12).

In Table 6 is given the comparison of the average intake by the two methods, as purchased and prepared food. From the results obtained at the University of Chicago Clinics, it may be concluded that the estimation of the average intake of hospital patients as determined either from prepared food or from food purchased is fairly accurate. Applying a waste factor of 25 per cent to the food as purchased method, there is an estimated calorie intake of 2850. This was furnished by 272 grams of carbohydrate, 97 grams of protein and 153 grams of fat, with a percentage distribution of calories as carbohydrate 38, protein 14 and fat 48. The corresponding figures on the prepared food basis show an estimated calorie intake of 3030. This was furnished by 329 grams of carbohydrate, 89 grams of protein and 151 grams of fat, with a percentage distribution

TABLE 6

Comparison of average food intake per patient per day on prepared food basis, with as purchased basis

	NUTRIENTS	CONSUMED	DISTRIBUTION OF FOOD VALUE
			per cent
Prepared food	Calories	3,031	
	Carbohydrate, grams	329	43
	Protein, grams	89	12
	Fat, grams	151	45
Food as purchased*	Calories	2,853	
	Carbohydrate, grams	272	38
	Protein, grams	97	14
	Fat, grams	153	48

* Waste factors (25 per cent) have been applied.

of calories as carbohydrate 43, protein 12 and fat 45. The difference in total calories by the two methods described is less than 10 per cent. This would seem to indicate that the method used for calculating intake from as purchased food is accurate enough for studies of this nature. It is time saving, therefore economical, and its simplicity makes it an extremely practical method to use periodically in checking the nutritive value of the dietary. The as purchased method for determining intake also provides an accurate basis for estimating sources of each nutrient. Calculating the calorie intake from the prepared food does not give an indication of the types of food furnishing the different nutrients without additional calculation. In this two weeks survey on the basis of prepared food, it was necessary to calculate the food value of over four

hundred recipes, and in the end the sources of nutrients in the diet were not available. Experience with good preparation in a general kitchen has shown that variations in the use of standard recipes make diet calculation by this method unreliable.

TABLE 7

Average food intake per patient per day by hospital divisions

	NUTRIENTS	SUPPLIED	WASTED		CONSUMED	
			Amount	Per cent	Amount	Per cent distribution of calories
Surgical (women)	Calories	2,977	367	12	2,610	
	Carbohydrate, grams	346	46	13	300	46
	Protein, grams	90	12	13	78	12
	Fat, grams	137	15	11	122	42
Surgical (men)	Calories	3,326	404	12	2,922	
	Carbohydrate, grams	382	43	11	339	47
	Protein, grams	103	13	13	90	12
	Fat, grams	154	20	13	134	41
Medical (men)	Calories	3,234	290	9	2,944	
	Carbohydrate, grams	359	32	9	327	44
	Protein, grams	94	9	10	85	12
	Fat, grams	158	14	9	144	44
Medical (women)	Calories	3,212	257	8	2,955	
	Carbohydrate, grams	357	27	8	330	45
	Protein, grams	95	8	8	87	12
	Fat, grams	156	13	8	143	43
Private (men and women) house menu	Calories	3,845	438	11	3,407	
	Carbohydrate, grams	399	51	13	348	41
	Protein, grams	110	18	16	92	11
	Fat, grams	201	18	9	183	48
Private (men and women) selective menu	Calories	3,937	605	15	3,332	
	Carbohydrate, grams	403	75	19	328	39
	Protein, grams	120	20	17	100	12
	Fat, grams	205	25	12	180	49

In Table 7 is shown the average food intake per day by hospital divisions. This is included for the purpose of comparing division intake with the total average intake. The intake per patient on medical and surgical divisions agrees within reasonable limits with the actual calculations from individual diet orders. There is a marked similarity of carbo-

hydrate intake for all divisions. The protein intake on the men's surgical division is approximately 15 per cent higher than on the women's surgical division, but conforms to the standard of 12 to 15 per cent of the total calorie intake. The protein intakes on the men's medical division and the women's medical division are the same. The fat intake is lower for the women's surgical division than the men's; the same holds true for the men and women on medical divisions. An average plate waste of 12 per cent is noticed on both surgical divisions. The higher calorie intake on the private divisions is probably due, first, to serving portions approximately 25 per cent larger than standard; second, to a menu system in which the patient selects his own food, within the limit of the diet order, from an elaborate menu; and third, to food leakage. The control of food supplies is not so rigid here as on other divisions. It is the custom to keep large supplies of food on the divisions to meet patients' requests for short orders, because a full time dietitian is not employed on this division.

Data for comparing the food intake of men with women patients, and medical with surgical patients, were available, but these are not tabulated here.

The average food intake for men and women was calculated. This showed that the total calorie intake is slightly higher for men patients, 2935 calories, than for women, 2780 calories. The increased calories are derived mainly from carbohydrate, 334 grams for men and 315 for women. The protein intake is practically the same, 88 grams for men and 83 for women. The plate waste of 11 per cent is constant for both groups.

The variations in the average intake of medical and surgical patients were also determined. The calorie intake of 2950 for the medical group is higher than for surgical patients, 2765 calories. The plate waste for the surgical group was 12 per cent, as compared with 9 per cent for medical patients. The variation may be explained by the fact that the division dietitians are in closer contact with medical patients and the waste is reduced to a minimum.

SUMMARY

The methods used at the University of Chicago Clinics for determining food intake from food purchased and food prepared agree within 10 per cent. If the calorie intake is determined from the prepared food basis, additional calculations are necessary to estimate the type of food furnishing the different nutrients. The as purchased method used is economical and practical for checking the nutritive value of the dietary and provides an accurate basis for estimating sources of each nutrient. Records kept

in this way should in the course of time yield valuable material for studying food requirements and trends in dietary habits. The as purchased method described is to be used only as a guide for the average intake of all patients. The individual intake will vary widely. At the time this study was made a record of the intake of individuals was also kept. This is not included in this report.

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OBSERVATIONS ON THE METABOLISM OF CARBOHYDRATE[1]

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INTRODUCTION

THE view that diabetes is essentially the manifestation of a decreased ability to metabolize glucose has been the background of diabetic therapy since Von Mehring and Minkowski demonstrated the results of pancreatectomy in Naunyn's laboratory in 1890. From that date until 1921, progress was achieved through an increasing appreciation of the necessity for quantitative diet, along two widely divergent lines of attack. Allen (1) and Joslin (2) emphasized the advantages of undernutrition in the sense of energy restriction; Newburgh and Marsh (3) emphasized the possibility and advantages of adequate nutrition. In 1921 two events of importance took place. The first was the publication of Woodyatt's classic paper (4), which furnished a quantitative basis for comparing different types of diabetic diets. The second, Banting's isolation of the pancreatic hormone, made possible the provision of maintenance levels of nutrition with any type of diet.

The polemic character of the discussions of a decade ago (5) were concerned with the question of the specific advantages of undernutrition. Recently, the term has again appeared as an explanation of reported startling utilization of carbohydrate by diabetic patients. Rabinowitch (6–8) has presented a plan of dietary treatment which:

(a) Includes extremely liberal amounts of total carbohydrate with especial emphasis on bread
(b) Restricts fat sharply
(c) Restricts calories so as to maintain the body weight at approximately 10 per cent below the statistical average (defined as "undernutrition")[3]

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[3] Insurance statistics (9) show that in those adults whose weight is approximately 10 per cent below the average for their age, the life expectancy is definitely higher than in those whose weight equals the statistical average. "Undernutrition" seems scarcely a suitable term for a nutritive level which promotes longevity.

Rabinowitch states "the average amount of insulin has not increased" under this plan, with an increase of carbohydrate from 86 to 246 grams and of available glucose from 130 to 295 grams daily.

The belief that diets high in carbohydrate may be well tolerated in diabetes is not new. The suggestion has been made previously by Geyelin (10), Sansum (11–12), Richardson (13), Gibson (14), Demarest and Koehne (15), Barach (16–17) and others.

Three hypotheses to account for the phenomenon are emphasized to a greater or lesser degree by the authors noted above. The one more often advanced is that carbohydrate stimulates the production of endogenous insulin (11). Porges (18) introduced a variation of this idea by suggesting that the contact of carbohydrate with the buccal mucosa was responsible for the increased secretion of insulin. Barach (16) puts the emphasis on the low fat content of this type of diet, stating that "one gram of fat requires as much insulin as two grams of carbohydrate." The third suggestion, that fat interferes with the normal insulin-glucose reaction is broadly suggested, though not directly stated, by Rabinowitch (8).

Without exception the proponents of high carbohydrate feeding have emphasized the transposition of fat and carbohydrate in the diet. Sansum, who in 1926 was one of the earliest to suggest this type of treatment, in 1931 is still in doubt "whether the beneficial clinical results which have been obtained by using these diets are due to the increase in the carbohydrates or the decrease in fats." Thus one finds two essentially contradictory points of view as bases for the treatment of diabetes. On the one hand, carbohydrate restriction to compensate for a metabolic defect; on the other, carbohydrate emphasis because it is apparently successful. To quote Rabinowitch again, "experiences with it (the high carbohydrate diet) are inconsistent with our present concept of the metabolism of diabetes."

DATA

The simplest situation in which one could test the difference between a high carbohydrate-low fat, and a low carbohydrate-high fat diet would be in a non-insulin patient. Tolerance has been so compared in the following cases:

Case 1. Mrs. H, aged 56, was admitted to the hospital with a diagnosis of diabetes. Her urine showed +++ sugar and a strongly positive ferric chloride reaction. She was placed on a diet of 50 grams of available glucose, derived from protein 30 gms., fat

130 gms., carbohydrate 20 gms., and yielding calories 1370. She became aglycosuric in three days. The diet was then gradually increased to determine her tolerance. The data are given in Table 1.

After cutting the diet sharply to abolish the glycosuria, it was again increased. This time, however, the diet was of the low fat-high carbohydrate type. Glycosuria appeared when the diet contained 184 grams of available glucose, as shown in Table 2.

TABLE 1

DATE	PROTEIN	FAT	CARBOHYDRATE	CALORIES	AVAILABLE GLUCOSE	URINARY GLUCOSE	INSULIN
	gms.	*gms.*	*gms.*		*gms.*		
January 1	55	190	130	2,450	181	−	0
January 2	55	190	140	2,490	191	−	0
January 3	55	190	140	2,490	191	+++	0
January 7	55	190	140	2,490	191	+++	0

TABLE 2

DATE	PROTEIN	FAT	CARBOHYDRATE	CALORIES	AVAILABLE GLUCOSE	URINARY GLUCOSE	INSULIN
	gms.	*gms.*	*gms.*		*gms.*		
January 14	61	91	140	1,618	184	−	0
January 15	61	91	140	1,618	184	+	0
January 16	61	91	140	1,618	184	++	0

TABLE 3

DATE	PROTEIN	FAT	CARBOHYDRATE	CALORIES	AVAILABLE GLUCOSE	URINARY GLUCOSE
	gms.	*gms.*	*gms.*		*gms.*	
February 18 to February 23	49	51	80	975	113	−
February 24	52	51	95	1,047	130	+
February 28	52	51	95	1,047	130	+++

The total available glucose which just produces glycosuria on a high fat diet was found to be 191 grams. On a low fat diet the amount was found to be 184 grams.

Case 2. Mrs. S., aged 43, was admitted to the hospital with a diagnosis of diabetes mellitus. Her urine contained ++ sugar and diacetic acid. She was placed on a diet of: Protein 34 gms., fat 86 gms., carbohydrate 14 gms., and calories 910, with a glucose yield of 34 gms. She became aglycosuric on the third day, and her diet was gradually increased until she was receiving 130 grams of available glucose. The data are contained in Table 3.

Her diet was first cut to 50 grams of available glucose to abolish the glycosuria, and again increased gradually, with the result appearing in Table 4.

It is apparent that in these cases there is no depressing effect upon tolerance due to a high content of fat in the diet. Stated differently, the tolerance observed is independent of the type of diet fed, and is dependent on one factor only, the total glucose available from the food stuffs metabolized. The fact that in the metabolic mixture the amount of fat may be very different from the fat in the diet is often overlooked. Only when the calorific supply equals the energy output is one entitled to disregard the question of extra-dietary fat. It is inevitable that in many of the so-called low fat, and consequently low calorie diets, the total fat metabolized has considerably exceeded the limits of a low-fat diet. This point may be illustrated in the case of our patient, V. B.

The patient's average 24 hourly insensible loss for the week of December 2 to 9, 1931, was 803 grams, by the *insensible loss method* of Newburgh,

TABLE 4

DATE	PROTEIN	FAT	CARBOHYDRATE	CALORIES	AVAILABLE GLUCOSE	URINARY GLUCOSE
	gms.	*gms.*	*gms.*		*gms.*	
March 13	62	220	73	2,520	131	–
March 14	62	220	73	2,520	131	+

Wiley, and Lashmet (19). His diet consisted of protein 50 gms., fat 151 gms., carbohydrate 48 gms., and calories 1743, with an available glucose of 92 gms. He was in nitrogen balance and aglycosuric. From these facts we find that the total transformation of energy for 24 hours is 1887 calories. Accordingly, his metabolic mixture consisted of protein 50 gms., fat 155 gms., and carbohydrate 48 gms. We are justified in this particular instance, therefore, in considering the diet fed and the food metabolized as essentially identical.

Had the diet contained 50 grams of fat instead of 151 grams, the protein and carbohydrate supplying 392 calories, 1495 calories would still have been required. Thus, 155 grams of fat would have been metabolized, even though his diet could have been described as "low fat."

If fat is without effect on the amount of glucose which can be metabolized by a diabetic patient not receiving insulin, should one expect a different type of response when exogenous insulin is added to the endogenous supply? We have been unable to confirm the statement of Barach (16), who maintains that he has "repeatedly seen an increase in

dietary fat followed by glycosuria," or of Rabinowitch (8), that the inclusion of extra bacon, cream, etc., resulted in glycosuria on an amount of insulin which had previously been sufficient. As will be noted in Table 6, an almost identical amount of insulin was required to metabolize two diets of 174 grams of available glucose, one of which yielded 1500 calories with a low fat content, while the other yielded 2680 calories with a high content.[4] The objection might be offered that in the cases cited, the high fat and therefore high calorie diets have been consumed over too short periods of time. Examples of patients who have consumed diets high in fat for extended periods are therefore pertinent.

Case 3. Dr. F. J., aged 35. A diagnosis of diabetes mellitus was made in 1920. Since then he has continuously been controlled with a high fat diet. From 1927 to the present his diet has consisted of protein 73 gms., fat 272 gms., carbohydrate 68 gms., calories 3012, and available glucose 135 gms, on which he maintained his weight. Insulin, 26 units, kept the patient continuously aglycosuric until 1931, a period of 4 years. At this time an acute infection made it necessary temporarily to increase the insulin to 50 units daily. This has been gradually decreased until he is again using 26 units daily.

Case 4. Mr. V. B., aged 19, was admitted to the hospital in May, 1928, three months after the apparent onset of his diabetes. At the time he was able to tolerate a diet of available glucose, 140 grams, 2550 calories, without insulin. Infections and several periods of uncontrolled glycosuria reduced his tolerance until in 1929, insulin 25 units were necessary to control him, on a diet of protein 55 gms., fat 220 gms., carbohydrate 65 gms., calories 2460, and 120 gms. available glucose. Because of the economic difficulties encountered in obtaining insulin, it was decided that he should, if possible, be controlled by diet alone. Accordingly, in May, 1931, he was established on a diet of protein 40 gms., fat 240 gms., carbohydrate 30 gms., calories 2440, available glucose 77 gms., and FA/G 3.2. He tolerated this diet without glycosuria for two weeks previous to discharge. He returned for check up in October, 1931, having gained 10 Kg. in weight. His tolerance at this time was just

[4] The study presented here has not been concerned with fat intakes of fatty acid glucose ratios high enough to produce ketosis. Of bearing on this point are the data reported by Ladd and Palmer (20). With FA/G ratios increased from 1.95 to 5.74, resulting in markedly increased acetone excretions, the fasting blood sugar remained essentially constant, varying from 0.81 to 0.95 mg. per cent over a period of 73 days.

exceeded by a diet yielding 78 grams available glucose even though acute infection had been present in the interval.

We cite these last two patients because they have been unusually coöperative and dependable, and because they have been under unusually close supervision. Also, the young diabetic is more sensitive to any factors tending to damage tolerance. Two facts are apparent from these data. The first is that tolerance in a diabetic (the largest amount of available glucose which can be metabolized in one 24 hour period without glycosuria) is not influenced by the fat contained in the diet. Tolerance is then a definitely measurable quantity. Presumably it represents the maximum endogenous insulin production possible in a given patient. The mode of operation of exogenous insulin added to that system is another problem.

TABLE 5

PROTEIN	FAT	CARBOHYDRATE	CALORIES	AVERAGE GLUCOSE	INSULIN*		URINARY GLUCOSE
					Minimum	Maximum	
50	130	48	1,562	90	10	26	–
52	122	64	1,562	106	10	28	–
55	114	79	1,562	123	10	36	–
58	106	93	1,562	137	12	43	–

* Minimum insulin = smallest number of units which would keep the patient sugar free. Maximum insulin = number of units which first produced a hypoglycemic reaction. Insulin was administered twice daily, $\frac{2}{3}$ the daily dose preceding the morning, and $\frac{1}{3}$ the dose preceding the evening meal. The available glucose of the diet was divided evenly between the three meals.

Here one encounters the pharmacology of insulin. That this is definitely related to the concentration of available glucose present is demonstrated by the data to be presented. Case 4, Mr. V. B., a year previously had tolerated without insulin a diet of protein 40 gms., fat 240 gms., carbohydrate 30 gms., calories 2440, and available glucose, 77.[5] He was admitted to the hospital in October, 1931, with a glycosuria following an acute upper respiratory infection and with several badly infected teeth. His glycosuria was controlled with insulin, and upon recovery from the acute rhinitis, the infected teeth were removed. After he had been continuously aglycosuric for 23 days, the experiment was begun. He was given a diet yielding 90 gms. of available glucose and 1500 calories, upon

[5] It is of interest to note that though the FA/G of the diet was 3.2 there was no diacetic acid in the urine.

which the possible range of insulin dosage was determined. From the minimum number of units which would keep the urine sugar free, insulin was increased two units daily to the maximum which could be administered without serious hypoglycemia. This range was determined for four levels of available glucose, as shown in Table 5.

To discover whether this performance represented an increase in tolerance, the diet was reduced to 90 and then to 81 grams available glucose, which without insulin produced glycosuria. After a period of

TABLE 6

PROTEIN	FAT	CARBOHYDRATE	CALORIES	AVAILABLE GLUCOSE	INSULIN	NOTES
gms.	*gms.*	*gms.*		*gms.*		
30	130	48	1,482	78	0	
33	122	63	1,486	94	7	
36	115	79	1,490	110	14	
39	107	94	1,494	126	21	Insulin reaction
42	100	109	1,498	142	21	
44	92	124	1,502	158	28	
47	84	140	1,506	174	35	Blood sugar, 98 mg./100 cc.
Insulin reduced 4 units daily to					16	No glycosuria
					12	Glycosuria
Diet changed to:						
55	220	120	2,680	174	20	No glycosuria
					16	No glycosuria
					12	No glycosuria
					10	Glycosuria
Diet changed to:						
66	173	218	2,690	274	36	No glycosuria
					32	No glucosuria
					30	No glycosuria
					28	Glycosuria

insulin administration he was given, successively, diets yielding 50, 60, 66, and 72 grams available glucose, and ranging from 1305 and 1500 calories, upon which he remained sugar free without insulin. Upon increasing the diet to 78 grams available glucose, however, glycosuria again appeared. We therefore believe this patient's tolerance is very close to 75 grams of available glucose, as it was a year ago. Certainly there was no improvement in tolerance to account for the fact that it was necessary to increase the insulin only 2 units, even though the available glucose was increased from 90 to 137 grams. Some other explanation must be sought.

At this point his diet was increased daily by 30 grams (1 slice) of bread,

the calories being kept constant by the removal of fat. Insulin was added and increased regularly. The data are given in Table 6.

Through the isocaloric shifts up to 174 grams of available glucose, these results are susceptible to the interpretation offered by Sansum (11–12) and Richardson (13), who emphasized the increased ability to utilize carbohydrate, when carbohydrate and fat are transposed in the diet. Sansum states (12) "the natural assumption seems to be that some feature of this particular diet (carbohydrate-rich, fat-poor) stimulated the production of an increased amount of endogenous insulin." When, however, one compares the almost identical amount of insulin required to avoid glycosuria on a diet yielding 2700 calories and 174 grams available glucose with that required for one yielding the same available glucose and 1500 calories, it is apparent that the insulin required is independent of the fat or energy content of the diet. In fact, slightly less insulin was required when the diet was high in fat than when it was low. The hypothesis that a fat-poor diet stimulates increased insulin production is therefore untenable. Such a relationship as exists must be between the available glucose and the insulin.

It has been shown that this patient can metabolize an amount of available glucose up to 78 grams. If one calculates the relationship between the insulin and the available glucose in excess of tolerance, the data in Tables 5 and 6 appear as follows:

TABLE 7

Grams of glucose metabolized per unit of insulin with increasing available glucose intake

AVAILABLE GLUCOSE		INSULIN	
Total	Beyond tolerance	Units	Efficiency
76	0	0	
90	14	10	1.4
106	30	10	3.0
123	47	10	4.7
137	61	12	5.0
174	98	14	7.0
274	198	30	6.6

Clearly the increase of glucose up to 98 grams, in addition to tolerance, resulted in a striking increase in insulin efficiency per unit.

In this form the results are strongly suggestive of the data obtained by Allan (21) in his studies on depancreatized dogs. A series typical of these experiments is reproduced in Table 8.

Here small doses of insulin are shown to be more effective than large

ones, a fact which corresponds with clinical experience. Also, increasing the amount of sugar included in the diet resulted in an increase in the amount of glucose metabolized per unit of insulin.

The effect of carbohydrate restriction upon the tolerance for glucose in normal individuals measured by the "glucose tolerance test" has been studied by a number of investigators. Heinbecker (22) studied the glucose tolerance in Eskimos. He compared the curves after glucose ingestion while the subjects were on their usual protein-fat diet, with those obtained after 82 hours of fasting. Very slight elevations in the blood sugar values were observed in the tests following the protein-fat

TABLE 8

	INSULIN	AVAILABLE GLUCOSE*	METABOLIZED GLUCOSE†	GLUCOSE EQUIVALENT‡
A	40	131	122	3.1
	32	131	111	3.5
	24	131	97	4.0
	20	131	116	5.8
B	20	82	75	3.7
	20	132	116	5.8
	20	182	151	7.5
C	32	82	80	2.5
	32	132	125	3.9
	32	182	150	4.7

Diet consisted of 600 gms. lean meat and in "A" 100 gms. cane sugar. In "B" and "C" 600 gms. meat and 50, 100 and 150 gms. sugar.

* Calculated as sucrose fed + urinary N x 3.625.

† Available glucose minus urinary glucose.

‡ Metabolized minus urinary glucose, gms. / Insulin Units

diet. Very high concentrations (260 and 300 mg. per 100 cc.) were observed in the tests which followed the periods of fasting. Tolstoi (23) compared the blood sugar curves in two healthy adults while on a diet of exclusively lean and fat meat, and on a general diet. The ingestion of 100 grams glucose in 230 cc. water produced high blood sugar values in both subjects on the protein-fat diet, the curves being of the so-called "diabetic type." After a general diet the blood sugar concentrations were only slightly elevated and quickly returned to the normal values, being essentially "normal" glucose tolerance curves. Tolstoi concludes that "in normal human beings, the quantity of insulin produced is

dependent upon the amount of carbohydrate ingested, irrespective of whether this foodstuff is administered as such or is derived from the protein fraction of the diet."

Sweeny (24) observed a striking difference in glucose tolerance curves obtained after two days of eating exclusively protein or carbohydrate foods, as compared with those obtained after two days of fasting or fat ingestion. Table 9, showing the average values for the four groups, is reproduced from his paper.

After an interval of one week the carbohydrate diet was taken by two subjects who before the previous test had been on the fat diet. A dextrose tolerance test showed an entirely normal curve. Three subjects who before the first test had taken the carbohydrate diet, were fasted for two days. The second dextrose tolerance tests, here too, were

TABLE 9

Average dextrose tolerance curves

TYPE OF DIET	BLOOD SUGAR (MG. PER 100 CC.) AFTER GLUCOSE			
	Fasting	30 minutes	60 minutes	120 minutes
Starvation (6 subjects)	67	145	188	184
Fat (4 subjects)	83	170	206	173
Protein (4 subjects)	69	143	167	145
Carbohydrate (8 subjects)	84	118	113	96

entirely different in type from those observed previously. The initial blood sugar values were much higher than before and remained at the high levels. It is evident that in these normal subjects the ingestion of an abundance of carbohydrate promoted its efficient utilization.

DISCUSSION

There are three lines of evidence, then, that the utilization of carbohydrate is greater when the amount included in the diet is high than when it is low. It is true in the healthy adult, in the diabetic patient, and in the depancreatized dog. The suggestion that the increased ingestion of carbohydrate increases the production of endogenous insulin, might hold for the first two conditions. It could not, however, apply to the third, where complete pancreatectomy had been performed, unless there is assumed to be extensive insulin production outside the pancreas.

Allan (21) suggested that "it is possible that the action of insulin on glucose proceeds according to the same laws as govern enzyme action, namely, the amount of substrate acted upon is not a linear function of

the amount of enzyme, except when there is a large relative excess of the substrate. This would mean in connection with the effect of insulin that when the amount of glucose available in the body is large compared with the dose of insulin, the amount of glucose actually metabolized is nearly proportional to the dose and is large for each unit. . . . . By increasing the amount of available glucose, as in the experiment [*see* Table 8], the same amount of insulin causes more to be metabolized per unit." Campbell and MacLeod (25) express the same view: "the action of insulin on glucose metabolism no doubt proceeds according to the same laws as govern enzyme action, namely, that the amount of substrate acted upon is not a linear function of the amount of enzyme, but is relatively much greater when there is a large excess of substrate compared with the amount of enzyme. This latter condition is fulfilled when small amounts of insulin are used, or when with larger amounts, the intake of sugar is increased."

Looking further, we find that Michaelis and Menton (26) showed that an equation based on the *law of mass action* might be derived from the digestion rate of saccharose by yeast invertin. Van Slyke and Cullen (27) confirmed this, using urea and urease. They found that the observed data were consistent with predicted values for a wide range of concentrations of substrate and enzyme. Having established this they were interested in determining whether the enzyme belonged to the class of contact catalysts, or acted by the formation of an intermediate labile compound with the substrate. If it acted by contact only, the reaction velocity should increase in direct proportion to the urea concentration. If it acted by formation of an intermediate compound with the substrate (urea), the presence of excess substrate should accelerate the reaction up to a definite point beyond which it should have no effect. This was found to be the case. There have been objections to the validity of the derivation and emphasis on the deviations from behavior as predicted by the *mass law*. Northrop (28) points out, however, that in the rate of digestion of albumin by pepsin the deviations are no greater than those observed in purely homogeneous solutions with purely chemical catalysts. Thus, in a physiological process the necessity for "vital" activity has been dispensed with, and the explanation based upon well established physical law. The relation between the effectiveness of insulin and the amount of glucose available for utilization accordingly suggests that one is dealing with a type of reaction similar to that observed in studies of enzyme activity. This suggestion is put forth tentatively. It involves first of all the assumption that insulin is an enzyme. It does not consider

an important source of error, namely, the excretion of insulin by the kidney. In the laboratory, studies such as quoted above can be carried out with the two reactants in a closed system. Such conditions are not possible to duplicate in the human body. The analogy is, therefore, the more striking.

Whatever the mechanism responsible for the action of insulin may be, the fact remains that the effectiveness of insulin is related to the absolute amount of glucose present. As the concentration of available glucose in excess of tolerance is increased, the ratio G/I, glucose to insulin, which expresses the efficiency of the insulin per unit, increases up to a definite maximum. Beyond this level further increases in the amount of glucose present are not attended by any increase in the effectiveness of the insulin. In the case studied, the maximum efficiency of insulin was obtained when the available glucose in excess of tolerance was approximately 100 grams. The insulin required was 14 units, giving a G/I ratio of 7. A subsequent increase of 200 grams of glucose beyond tolerance, required 30 units of insulin, giving a G/I ratio of 6.6. Accordingly, additions to the diet of more than 100 grams of glucose beyond tolerance were without effect on the insulin efficiency. On the other hand, the increases beyond tolerance of from 14 to 100 grams resulted in an increased utilization of from 1.4 to 7.0 grams glucose per unit insulin.

It is therefore unnecessary to postulate that in the normal individual insulin secretion is proportional to carbohydrate intake. Although this may be true, it is equally possible to conceive of a fairly constant insulin secretion which operates at various levels of efficiency, depending on the concentration of substrate present.

In diabetes the maximum amount of glucose which can be disposed of in one 24-hour period (tolerance) is a summation of two factors:

(1) The maximal endogenous production of insulin of which the particular patient is capable
(2) The presence of a concentration of glucose providing optimal activity for this maximal insulin production

With respect to the treatment, the patient with mild or moderately severe diabetes may be given diets which meet his energy requirement, without the use of insulin, by the use of diets "high fat" in character. For those patients, however, whose tolerance does not permit the construction of a diet equal to their energy requirement, and for whom insulin is therefore indicated, the most efficient use of the insulin given will be made if the carbohydrate of the diet is significantly increased.

CONCLUSIONS

1. Increase or decrease of fat with constant amounts of dietary glucose has been found to be without effect upon either:

(a) The total amount of available glucose which can be metabolized by patients not receiving insulin

(b) The amount of insulin required to maintain aglycosuria

2. The amount of available glucose metabolized per unit of exogenous insulin has been shown to increase as the amount of available glucose increases up to 100 grams beyond the tolerance of a diabetic patient.

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THE INFLUENCE OF BRAN ON THE ALIMENTARY TRACT

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INTRODUCTION

AS SOON as man discovered that the inside of the wheat kernel was more delightful as a food than the outside, he developed devices for separating the bran from the endosperm. Today no one would wish to dispense with the fine white flour which is the modern miller's pride, and which in the form of bread, crackers, macaroni, cakes, etc., gives sustenance and joy. But the use of any good thing may be carried too far. If in making up our daily ration we choose highly milled wheat flour to furnish perhaps one-third of the calories of the diet and proceed to add cane sugar, butter and lean meat, each in amounts to supply another sixth of the total energy for the day, there is little opportunity left for the use of foods carrying fibrous material to serve as ballast in the alimentary tract. For most normal people some ballast seems to be desirable. The cellulose-hemicellulose mixture constituting a large part of the so-called crude fiber of vegetables is often sufficiently delicate to be readily destroyed by bacteria of the alimentary tract. Thus Lohrisch (1) found cellulose disappearing from the digestive tract of man in spite of the fact that there are no alimentary enzymes capable of hydrolyzing it. In the case of white cabbage the disappearance was practically complete, for carrots 95.0 per cent, for spinach 90.5 per cent, for kohlrabi from 79.1 to 81.8 per cent. Even with lentils 45 per cent of the fiber was not recovered.

It happens that small amounts of the more resistant forms of cellulose are dissolved by bacteria in the alimentary tract of man as well as in ruminants. Khouvine (2) has reported the isolation of such an organism from human feces which she named *Bacillus cellulosae dissolvens*, and which she found dissolved cellulose in vitro. According to Lohrisch (1) the fiber of wheat is fairly resistant, his figures for bread cellulose ranging from 58.8 to 84.8 per cent.

While no one would suggest a general return to the exclusive use of whole grains, simply ground, the inclusion in the modern diet of a small

portion of the bran removed from the wheat to be consumed as patent flour would seem a very practical way of getting some fiber which is not likely to be entirely disintegrated. This bran has the additional advantage of furnishing a considerable amount of vitamin B (3) and of readily available iron (4), neither of which is likely to be overly abundant in the average diet. As Taylor of the Food Research Institute, Stanford University, has frequently pointed out, it is undoubtedly more practical to mill cereals, and then use the various fractions in such proportions as seem most useful. The present study deals with the effect on the alimentary tract of including daily in the diet a moderate portion of wheat bran prepared for human consumption by steaming and crumbling. In this form many persons find it very palatable. They enjoy its crispness and marked wheat flavor and find that it furnishes the slight stimulus needed for regular, satisfactory evacuation. A characteristic of normal smooth muscle is its responsiveness to tension. Most of the motor activities of the stomach and bowel are brought about and regulated by the internal pressure due to the presence of food or gas. As Alvarez (5) says, "Constipation may develop if the colon is too thrifty in absorbing food residues and water or if the diet is too poor in roughage or in other substances that stimulate peristalsis."

Normal persons leading sedentary lives require less food to meet their energy needs than those doing much physical labor, hence they are inclined to eat highly refined foods because of little desire for a large volume of food, and are in consequence liable to constipation which may often be corrected by supplying a little more roughage in a form not unpleasantly bulky. Unless they happen to harbor bacteria which ferment it or unless their motor processes are too slow this procedure may prove eminently satisfactory as a routine precaution.

It is a mistake, however, to think that bran is mostly cellulose, as the actual amount in pure bran is only about 11 per cent of the total weight and in commercial bran about 9 per cent owing to the presence of considerable starch. The chemical analyses which have been reported by Osborne and Mendel (6) show for pure and commercial bran, water-free, the values, shown in tabulation on page 135.

It will be noted that there is a large percentage of the bran undetermined by the usual methods of analysis. Distribution of this undetermined fraction over the eight other items of such an analysis would not result in striking changes of the figures, but makes us realize that the true values for the various carbohydrate fractions are somewhat above the respective amounts reported. Of the total carbohydrate in commercial

	PURE BRAN	COMMERCIAL BRAN
	per cent	*per cent*
Sucrose	1.92	1.64
Dextrin	5.03	4.19
or starch	0.00	13.39
Pentosans	32.77	27.58
Crude protein	17.60	17.00
Fiber	11.18	9.37
Fat	8.26	7.07
Ash	8.61	7.24
Undetermined	14.63	12.52

bran about one-third may be considered available to man as a source of energy, leaving two-thirds not convertible into monosaccharides by the human digestive enzymes. Of this indigestible part, about three-fourths consists of hemicelluloses, which according to Norris and Preece (7) yield four chemically and physically distinct fractions, one of which appears to be a glucosan, while the others are largely pentosan.

As shown by one of us (8), even those hemicelluloses which are readily soluble in water are not necessarily nutritive, since there may be no enzyme in the alimentary tract capable of hydrolyzing them. Some resemble cellulose in being highly resistant to the common bacterial inhabitants of the tract, as the galactans of *Chondrus crispus* (Irish moss) and of agar-agar, and may be recovered 100 per cent in the feces. Others, as inulin, the levulan from the Jerusalem artichoke, are readily attacked and may not appear at all in the feces unless very large amounts are ingested so that some portion escapes unchanged. Since the bacterial flora shows great variability, it is quite likely that the amount of hemicellulose excreted unchanged and the amount converted into simpler substances will depend very much upon the individual. This is well shown in a study of the digestibility of bran by Holmes (9). With a daily ingestion of 155 grams of finely ground bran the coefficients of digestibility for carbohydrate ranged from 28 to 75 per cent. Assuming one-third of the total carbohydrate to be completely available, a coefficient of 75 per cent would mean that all the hemicelluloses had disappeared under the influence of bacteria, while a coefficient of 28 per cent would mean that almost none of them had been altered by bacteria. In these experiments there was great variation in the laxative property of the diet uncorrelated with the coefficients of digestibility. This might be due to differences in sensitiveness to products of fermentation or to mechanical influence of unaltered bran residues.

The vitamin B content has considerable interest in connection with a study of the effect of bran on the alimentary tract. McCarrison (10) has repeatedly called attention to the many forms of subacute indigestion which occur on diets too low in vitamin B, and Fletcher and Graham (11) have reported very striking improvement in certain cases with very low intestinal tonus upon inclusion in the diet of large daily portions of yeast or wheat germ, both of which are exceedingly rich in this vitamin. Morgan and Barry (12) have called attention to the value of cereals as a source of vitamin B, and while their experiments dealt with the germ which is weight for weight the richer source, the amount of vitamin B in bran is far from negligible. Rose, Vahlteich, Funnell and MacLeod (3) found that the amount of a specially prepared bran required to furnish one unit of vitamin B was 0.6 gm. while the amount of the original bran was 0.3 gm., the difference being due to the mode of preparation. Mottram (13) found that a bread in which wheat germ contributed 28 per cent of the weight, although practically cellulose-free, exerted a decidedly laxative effect over a period of 22 days.

According to the analyses already referred to, the ash of commercial bran constitutes about 7 per cent of its weight, and the question naturally arises as to its relation to the laxative effects of bran. Phosphorus is the element present in largest amount, and this is held partly in the form of inosite esters of phosphoric acid in combination with bases such as calcium, magnesium, and potassium. Such inosite-phosphates, known as phytins, constitute according to Averill and King (14) from four to five per cent of the weight of natural bran. At one time it was thought that the laxative effect was chiefly due to these compounds, but as shown by A. R. Rose (15) for cows, and by Falcon-Lesses (16) for rats, phytin-free bran is as laxative as the natural bran and administration of pure phytin does not have any laxative effect.

According to Falcon-Lesses, bran ash at levels of 0.6 per cent (48–66 mg. daily) and 1.2 per cent (100 mg. daily) of the diet has in periods of from four to six days little effect on the number or character of the stools. The relation of the ash to the laxative properties of bran has also been approached by feeding the crude fiber prepared from the bran and its equivalent in pure cellulose prepared from paper pulp. In some of the earlier work, before the discovery of vitamin B, failure to provide this vitamin adequately at all times may have been a complicating factor. But Williams (17) took the precaution to add vitavose to a basal diet for dogs consisting otherwise of casein, sucrose, lard, cod liver oil and an adequate salt mixture. To this was added bran washed with cold water

until starch free (ash content about one-half that of the original bran) in an amount equal to 10 per cent of the weight of the food, or from nine to fourteen gms. per dog daily. Frequency of defecation increased, but the weight of the dry feces was less than one gram for each gram of bran eaten. The moisture, however, rose to four or five times that of the control periods, about two grams additional being eliminated for each gram of bran eaten.

Williams also studied pure cellulose and crude fiber prepared from bran in an amount equivalent to the crude fiber content of the washed bran (17.24 per cent). Gram for gram the crude fiber produced more feces than the paper pulp or washed bran and increased the number of defecations to a greater degree. It would appear, then, that Williams has shown the laxative effects to be chiefly due to the amount of the crude fiber which resisted change in the alimentary tract, and was therefore able to stimulate secretion and motor activity. The physical character of the crude fiber from bran appeared to be more favorable to laxation than that of the cellulose from paper pulp. In 18 cases out of 24 bran was not feces-forming, the increase in the feces being less than the weight of bran fed. In every case crude fiber was feces-forming.

Recently the question has been raised as to possible unfavorable effects from habitual use of bran. Just as with white flour its use may be overdone. Very large quantities of indigestible material cannot be regarded as having any advantage for ease or completeness of digestion. On the contrary, they may interfere with the normal absorption of the nutrients in the diet. Furthermore, there are persons with hypersensitive alimentary tracts, liable to stasis upon the least irritation, mechanical or chemical. Such persons react unfavorably to food residues in practically all forms and need specially prescribed diets, taken under medical supervision. As Alvarez (18) has aptly said, "It should be obvious that roughage cannot be prescribed for every one, and at times the factor of digestibility must come first." Laboratory studies on both men and animals have given no evidence of harmful effects. In 1918 Voegtlin and Myers (19) reported that mice grew normally for three to four months when fed a whole wheat bread and salt mixture. The bread was made of whole wheat crushed in an ordinary kitchen mill, canned eggs, salt, olive oil, molasses, lard, pressed yeast, and wheat bran. They found it "rather surprising that such delicate organs in the gastrointestinal tract of young mice can tolerate a diet containing such a large amount of bran." Hindhede (20) in 1923 reported that during the blockade, the Danish war rationing was largely based on the value of

bran. One of the chief measures taken was that of grinding whole rye and adding 12 to 15 per cent of wheat bran for bread-making purposes. Bran was reserved for human consumption only. During the rationing the people ate "less meat, less coffee and less white bread, but more potatoes, large quantities of barley meal porridge and unusually coarse bran bread." The main influence on the state of health of the people was a decrease in the death rate in the age group 25 to 65, whereas after rationing ceased, the death rate increased again.

Murphy and Jones (21), feeding a diet in which 70 per cent of bran constituted the source of protein for young rats, found that they grew excellently for 15 to 16 weeks, thus proving that the bran proteins were digested and absorbed. The authors state further that the rats manifested every indication of well being and no instance of digestive disturbance was observed.

Mattill (22), using rats as the experimental animals in studying the biological value of some cereal proteins found that the presence of the bran coats in a whole wheat cereal food, finely ground, did not alter the biological value of the proteins of the whole wheat as compared with those of the wheat endosperm. Furthermore, Mattill and Smith (23), investigating the rate of digestion and absorption of cereal foods by rats, reported that the addition of from 15 to 20 per cent of bran to a finely ground, refined cereal food had little if any effect in slowing the rate of stomach emptying. There was observed a slight tendency for the bran particles to accelerate the passage of a cooked cereal preparation through the stomach, but this was attributed to the physical consistency of the cooked cereal rather than to the presence of the bran. Observations made by Clough, Carman and Austin (24) on the response of the human subject to various cereal breakfast foods, led them to conclude that roughage, in the form of bran in the proportion in which it naturally occurs in a cereal food, influences evacuation time of the stomach very little.

McCay (25), studying the effect of roughage upon growth of young rats, found no evidence of physical injury in the course of 10 months or more, when cellophane was included in the diet at levels of 10 and 20 per cent, nor when agar-agar was fed at a 20 per cent level, although growth was distinctly retarded even on high calorie diets. He also fed similar proportions of roughage to brook trout and found that in spite of their very short intestinal tracts there was no retarding influence on growth, which would indicate no significant decrease in alimentary efficiency.

Hoelzel and Da Costa (26), in the course of studies on the production of

ulcers in the prostomach of rats by protein restriction, found that no ulcers were produced when the animals were fed bran, although they occurred on cellulose-free diets with restricted protein. They suggest that the bran serves to bind the acid and thus protect the tissues.

Bloom (27) concluded from feeding experiments with spinach and with filter paper that crude fiber had no detrimental effect on the retention of calcium and phosphorus. The quantity of feces of adult rats, however, increased with the increase of fiber in the diet.

The conclusions which it appears safe to draw from the experimental work reviewed are that crude fiber is laxative if taken in considerable amounts; that injury to the alimentary tract has not been observed; that much of the non-nutritive carbohydrate of bran may disappear in the alimentary tract; that in the few cases observed, the ash has little if any laxative power; and that the vitamin B content may be a factor in the laxative properties of bran if the diet be otherwise poor in this dietary essential.

Since no extensive comparative studies of the influence of all of these factors on one species of animal have been made, and especially since no study has dealt with such a moderate amount of bran prepared specially for human consumption as has become for many individuals a part of the daily routine, the present investigation was undertaken to see how far the above observations could be confirmed. The white rat, which resembles the human being in its alimentary processes, was chosen as the most satisfactory species for long controlled experiments. This work on animals has been supplemented, however, by a study of 38 girls in an institution where the character of the daily dietary seemed favorable to our purposes, and by special studies on five adult women.

I. THE LAXATIVE EFFECT OF BRAN IN THE ALIMENTARY TRACT OF THE WHITE RAT

Thirty-two rats have been used in this study. They were weaned from mothers whose diet was in all cases alike and started on experimental diets at the age of four weeks. Four basal rations were used. Diet I consisted of casein, 18 per cent; cornstarch, 48 per cent; salt mixture, 4 per cent; butter, 8 per cent; cod liver oil, 2 per cent; and baker's yeast, 20 per cent. Diets II, III, and IV were like Diet I, except that in Diet II one-half of the yeast was replaced by an equivalent amount of cornstarch; in Diet III three-fourths of the yeast were so replaced; and in Diet IV no yeast was included. The purpose of Diets II, III, and IV was to provide rations of varying vitamin B content, which would approximate different

dietary habits of human beings. Supplements were used with these diets in daily dosage as follows:

(1) 0.3 gm. prepared bran. This proved too small a quantity to get any laxative effects and data for the first four weeks during which this was fed are not reported.
(2) 0.6 gm. of prepared bran.
(3) The ash of 0.6 gm. of prepared bran.
(4) Leached bran from 0.6 gm. of prepared bran. This was prepared by allowing bran to stand for 48 hours in 5 times its weight of 1 per cent HCl, washing with 4 liters of water, making neutral with 1 per cent NaOH, and drying.
(5) Ash of 0.6 gm. of prepared bran plus ashless filter paper finely cut, equal to the weight of the leached bran (0.34 gm.).
(6) 1.2 gms. of prepared bran.
(7) The ash of 1.2 gms. of prepared bran.
(8) 2.4 gms. of prepared bran.

To Diet I various common laxatives were also added to test the rat's response to laxatives of other types than bran and its ash. One of these was liquid cascara sagrada given in doses of 12 drops ($\frac{1}{5}$ adult human dose). Another substance was an infusion of dried senna leaves, made in the laboratory by steeping 3 gms. in 40 cc. of water, straining, and giving $3\frac{1}{4}$ cc. of the strained product as the daily dose ($\frac{1}{16}$ adult human dose); a third was a commercial laxative vegetable-fruit paste,[1] in doses of 0.5 gm. per day ($\frac{1}{16}$ adult human dose); and a fourth, milk of magnesia, in doses of 12 drops daily ($\frac{1}{20}$ adult human dose).

The order of the diets and supplements was varied with different animals to minimize as far as possible the effect of the diet in any one period upon the next. Each rat was given in successive three-week periods, the basal diet and a certain number of the combinations listed above, since in preliminary trials it had been found that the amount of feces and amount of moisture varied too much from rat to rat to have a special group serve as controls. The uniformity of results with the control diet (Diet I) is very striking, regardless of its place in the series of tests. This is specially well shown in animals kept on the control diet for long periods (Rats No. 1, 2, 9, 16, 17, 21, 26, 32). The order in which the diets were given and the supplements fed to each animal appear in Table 6.

The rats were kept in individual cages with floors of $\frac{3}{8}$ inch mesh, so that the feces would drop through readily and thus escape consumption. At first the feces were collected hourly, but the variability of the same rat

[1] Boal's Rolls.

from day to day and week to week was so great that there seemed no justification for the labor involved, so thereafter the feces were collected regularly, at nine A.M. and at five P.M., weighed, and dried to constant weight at 110°C. Since the rats were growing and the amount of feces was increasing somewhat with the size of the animals, the ratio of the weight of the rat to the weight of dry feces has been calculated to correct for changes which might be due to size only.

TABLE 1

Number of rats showing the effect of various supplements on the ratio of body weight to weight of dry feces

++, marked increase in feces; +, moderate increase in feces; ?, doubtful as to any significant increase; −, no increase or a decrease.

BASAL DIET NUMBER	SUPPLEMENT	++	+	?	−
I	0.6 gm. bran	10	10		
I	Ash 0.6 gm. bran	1	4	6	6
I	Leached bran from 0.6 gm. bran	11	7		
I	Ash 0.6 gm. bran + 0.34 gm. filter paper	5	11		
I	0.6 gm. bran biscuit		6		
I	1.2 gms. bran	5	1		
I	Ash of 1.2 gms. bran			1	6
I	Leached bran from 1.2 gms. bran	2	4		
I	1.2 gms. bran biscuit	1	1		
I	2.4 gms. bran	2	3		
II	None				4
II	0.6 gm. bran				15
II	1.2 gms. bran		4	6	2
III	None				4
III	0.6 gm. bran				4
IV	2.4 gms. bran	2	2		

In the rat, the best criterion of the possible laxative effects of the various diets appears to be the ratio of the weight of the rat to the weight of the dry feces. These ratios are given in Table 6. The various diets with supplements have all been compared with the control diet (Diet I) and marked ++ if the feces were markedly increased, as shown by a low ratio; +, if only moderately increased; ? if the change was very slight; and −, if the diet were more feces-forming than Diet I. The results are summarized in Table 1.

Collecting the feces in 12-hour periods, there was inevitably considerable loss of water, but since the conditions were the same for all the rats, the moisture content of the feces as collected still seems to afford some measure of whether a given supplement resulted in feces relatively moist or relatively dry. Those with decidedly low water content have been checked and the number of cases in which this happened is shown for each type of diet in Table 2.

From these tables it will be seen that the addition of 0.6 gm. of bran to Diet I caused an increase of feces in all twenty cases, carried through a three-week period. The same was true in about the same degree for leached bran, and only slightly less marked for ash of 0.6 gm. bran plus filter paper. As was to be expected, the addition of 1.2 gms. of bran also

TABLE 2

Number of rats showing a low percentage of water in the feces

BASAL DIET NUMBER	SUPPLEMENT	TOTAL NUMBER OF RATS	NUMBER SHOWING LOW PER CENT OF WATER IN FECES
I	0.6 gm. bran	20	4
I	Ash 0.6 gm. bran	17	10
I	Ash 0.6 gm. bran + 0.34 filter paper	16	9
I	0.34 gm. leached bran	18	3
I	1.2 gms. bran	6	3
I	Ash 1.2 gms. bran	7	2
I	0.68 gm. leached bran	6	4
II	0.6 gm. bran	15	2
III	0.6 gm. bran	4	1

increased the feces, but the effect was only a little more marked than for 0.6 gm. There was no marked difference between 1.2 gms. of the prepared bran and 1.2 gms. of the leached bran. Addition of 0.6 gm. and 1.2 gms. portions of a bran biscuit prepared like a shredded wheat biscuit from very finely ground bran showed a good response in the 8 animals fed, but not quite so marked as the addition of prepared bran, especially in the case of 0.6 gm. When the whole bran was increased to 2.4 gms., the laxative effect as shown by increase of feces was very definite in the five cases tried.

The ash of the bran, whether from 0.6 gm. or 1.2 gms., had little laxative effect. Out of a total of 24 cases, 19 gave positively less feces than Diet I alone.

When instead of the diet liberal in vitamin B (Diet I), one with only half as much vitamin B was used as the basal ration (Diet II), there was a

definite constipating effect from the diet alone (4 cases) which was not overcome by adding 0.6 gm. of bran (15 cases). Therefore the additional fiber and vitamin B in this small supplement were not enough to compensate entirely for the large withdrawal of vitamin B. When 1.2 gms. of bran were used, the lack of vitamin B was overcome, four out of twelve cases showing some laxative effect, although none were sharply marked as laxative in comparison with Diet I plus 0.6 gm. of bran.

When Diet III with only one-fourth as much yeast as Diet I was fed, the result was constipation in all four animals and the addition of 0.6 gm. bran was not sufficient to overcome this in any case.

When Diet IV, containing no yeast, was supplemented with 2.4 gms. of bran a very definite laxative effect was produced. It would seem from these cases, as well as those on Diet II plus 1.2 gms. bran, that in diets low in vitamin B, the addition of bran produces a laxative effect partly from the contained fiber and also partly from the vitamin B.

II. STUDY OF THE LAXATIVE EFFECT OF BRAN ON GIRLS IN AN INSTITUTION

This part of the study was undertaken to find out whether the addition of a moderate amount of bran to the diet of normal girls would produce any measurable laxative effect. The regular routine of institutional life, as well as the diet, adequate but varying little in type from day to day, seemed to offer good control of other factors.

One group of 23 girls, aged 10 to 12 years, was selected because of the reliability and coöperative attitude of the house mother. The other group of 15 were of high school age and only those who were interested to help with the experiment participated. After a few preliminary visits, when a feeling of friendliness had been established, the proposed experiment was explained to the children. The younger children were then started on a four-week period during which 2 tablespoonfuls (14 gms.) of prepared bran were added to the breakfast cereal of each child every day. Then followed a control period of three weeks without the bran. Individual records of daily defecations were kept by each child throughout the entire period of 7 weeks. While no claim to complete accuracy can be made, it is felt that because of the close and constant supervision of the house mother and the genuine interest which the children displayed, they are as reliable a source of information as it is possible to obtain under such circumstances. The excellent coöperation of the institution staff made it possible to visit the children almost daily and to conduct an informal nutrition class on Saturday mornings.

With the older girls the plan worked out similarly except that the con-

trol period preceded the period in which bran was added. The response from this group was good, as a whole, but because of the greater influence of outside activities, the records are less complete and for a shorter period (four to six weeks) than those of the other group.

The results were considered on the basis of the percentage of days in which there were 0, 1, 2 or 3 defecations daily. The figures for the two periods were then compared and any laxative effect of the bran period over the control period was indicated by use of the symbol + for definite

TABLE 3

Daily defecations of three girls expressed in percentage of the total number of days

SUBJECT	TOTAL NUMBER OF DAYS	PERCENTAGE OF DAYS				LAXATIVE EFFECT
		3	2	1	0	
W. C.	28 (bran)		36.0	60.0	4.0	+
	21 (no bran)		19.0	67.0	14.0	
J. T.	28 (bran)		18.0	46.0	36.0	?
	21 (no bran)		5.0	67.0	28.0	
B. D.	28 (bran)	7.0	22.0	53.0	18.0	−
	21 (no bran)	5.0	19.0	76.0	−	

TABLE 4

The effect of bran as shown by the number of girls giving positive, neutral or negative results

+, definite laxation; ?, doubtful laxation; −, no laxation.

GROUP	NUMBER OF GIRLS	+	?	−
years				
10–12	23	11	9	3
14–16	15	8	4	3
Total	38	19	13	6

laxation, ? for questionable laxation, and − for no laxation. To illustrate, the records of three individuals are shown in Table 3.

From this table it will be seen that W. C. in 28 days on bran had 2 defecations on 10 days (36 per cent), one defecation on 17 days (60 per cent) and no defecation on 1 day (4 per cent). In 21 days without bran, she had no defecation on 3 days (14 per cent), and two defecations on only 4 days (19 per cent). Thus the number of defecations was distinctly increased by the bran. In contrast, B. D. who had as high as 3 defecations on 2 days on bran (7 per cent), also had 3 defecations on 1 day with-

out bran (5 per cent) and fewer days without defecations when bran was omitted. Here is a case where the most satisfactory defecation occurred with no bran added.

The results summarized in Table 4 indicate that the daily addition to the diet of 2 tablespoonfuls (14 gms.) of bran had a laxative effect in the majority of these cases.

In case of the 10 to 12 year-old group the number of girls in whom the effect of the bran was definitely laxative was 11, while only 3 showed negative results. In case of 9 girls, the results were not sufficiently regular to call the results either positive or negative. These are marked ? in the table.

Of the 15 girls in the group from 14 to 16 years of age, 8 showed a definitely laxative effect, 3 were negative, and 4 showed little response one way or the other. Of the total 38 girls, 50 per cent showed increased laxation, 35 per cent were little affected as far as could be judged, and 15 per cent were definitely unaffected by this small daily dosage of bran over a four-week period.

III. LAXATIVE EFFECT OF FINELY GROUND BRAN ON ADULT WOMEN

In order to learn the laxative effect of finely ground cereal bran when added to the ordinary varied daily dietary, five adult women were used as subjects. To make the experimental conditions similar to those found in every day experience, three active subjects (F, R, and A) and two sedentary subjects (M and L) were chosen. They were allowed to follow their usual routine as to selection of foods. With the exception of one diet, which contained more than the average amount of roughage usually eaten (Subject A), these dietaries consisted of refined cereals, milk, two or three cooked vegetables, meat, with salad and an uncooked vegetable several times weekly. Since the first seven days served as a control period, no bran was eaten, then 34 gms. of a finely ground bran in the form of a biscuit were eaten daily for two and one-half months, except when this diet was found to be too laxative; then it was reduced. For subject L, in Period II, only 25 gms. of bran were consumed daily for this reason.

The whole experimental period consisted of five consecutive parts; (1) Period I, 7 days in which no bran was eaten, but feces collected; (2) one month in which bran was eaten, but no feces collected, (3) Period II, 7 days in which bran was eaten and feces collected; (4) one month, in which bran was eaten, but no feces collected; and (5) Period III, 7 days in which bran was eaten and feces collected. It was thought that Period

III would show whether the laxative action of the bran had worn off after two months. The wet feces were weighed, mixed with alcohol, and evaporated to dryness. The average daily weights of wet and dry feces and the percentage moisture as well as the percentage increases of these figures for the bran periods over the no-bran period are given in Table 5. In one case (Subject A) the bran, added to a diet already rather high in roughage, was found to be too laxative, and therefore was discontinued after Period II.

TABLE 5

Average daily weight of feces during periods of no bran and of bran consumption by adult women

SUBJECT	PERIOD	WET WEIGHT	DRY WEIGHT	PER CENT WATER	PER CENT INCREASE OVER PERIOD I		
					Wet weight	Dry weight	Per cent water
		gms.	*gms.*				
F	I No bran	52	16	69.5			
	II Bran	130	43	66.8	150.0	168.5	−3.9
	III Bran	122	31	74.5	134.8	93.7	+7.2
M	I No bran	72	23	68.4			
	II Bran	112	31	72.4	55.6	34.8	+5.8
	III Bran	97	25	74.1	34.8	8.7	+8.4
L	I No bran	119	28	76.5			
	II Bran*	171	45	73.8	43.7	60.7	−3.0
	III Bran	190	50	73.6	59.5	78.5	−2.9
R	I No bran	147	22	84.6			
	II Bran	166	36	78.3	12.9	63.7	−7.4
	III Bran	197	56	71.7	34.0	154.5	−15.2
A	I No bran	104	31	70.2			
	II Bran	161	37	77.0	54.8	19.4	+8.8

* Twenty-six grams bran daily eaten as compared with 34 gms. in the other bran periods.

It will be noted that the total weight of both the wet and dry feces was increased in every case during the bran period. The change in per cent of water was not great; and in only 4 out of 9 cases was it increased. In no case was the bran feces-forming since the increase in the feces was less than the bran fed. The effect of the bran had not worn off after 2 months.

IV. THE INFLUENCE OF BRAN ON THE TISSUES OF THE ALIMENTARY TRACT OF THE ALBINO RAT

Pappenheimer and Larimore (28) have called attention to the fact that rats on complete artificial diets were normal as to the stomach and

esophagus although animals on deficient diets frequently showed gastric lesions, especially if large amounts of hair were ingested, either naturally or purposely administered. Ulcers were experimentally produced when chopped hair was added to a complete diet, suggesting that ingested hair may act as a mechanical irritant or as the carrier of an infective agent. Mitchell, Bradshaw and Carlson (29) found that 90 per cent of their rats on paste food containing 25 to 27 per cent of fat developed hair balls in the stomach and that microscopic examination of such cases disclosed inflammation and ulceration of the gastric mucosa.

Addis (30) found that after 44 days the lengths and weights of the large and small intestines and of the stomachs were increased 8 to 48 per cent, when rats were fed a high roughage diet consisting of 40 per cent dry alfalfa and 10 per cent agar-agar. These results were interpreted as an example of work hypertrophy.

To determine the effect of bran on the tissues of the alimentary tract of the animals used in this study, sections were made of the esophagus, stomach, small intestines, caecum, large intestine and colon of 24 rats. This was made possible through the kind coöperation of Miss Estelle Morton, an expert pathologist, working under the guidance of Professor Pappenheimer, who made and examined the sections for us.

Of the 24 animals, 6 studied in Part I of this paper were killed and sections made at the end of the experimental period of about 8 months. During these 8 months, Nos. 1 and 2[2] had been fed Diet I alone, these serving as normal controls, and Nos. 10, 14, 15 and 18[2] had been fed Diet I plus a bran supplement for about 4 months and for the remaining 4 months Diet I alone, Diet I with bran ash, Diet I with laxatives, and Diet II plus bran respectively.

Because these 6 animals were not fed bran continuously, 18 animals at the age of 28 days were given 3 different diets each containing bran, and the digestive tracts of 2 on each diet were examined after 8, 12 and 16 weeks respectively. The 3 diets were (1) Diet I plus 1.2 gms. bran daily, (2) Diet I plus leached bran from 1.2 gms. bran daily and (3) Diet IV plus 1.2 gms. bran daily, this latter being included to determine whether limiting the supply of vitamin B would affect the tissues.

In every one of the 22 rats fed bran as well as the two controls which ate no bran, the tissues were diagnosed as normal, no lesions of any kind being found. Therefore it is concluded that bran fed in moderate quantities, such as is usual in human consumption, will not damage the tissues of the normal alimentary tract.

[2] *See* Table 6.

TABLE 6

Table showing diets given to 32 rats for successive three-week periods, per cent of water in the feces and ratio of weight of rat to weight of dry feces

++, indicates marked laxation; +, indicates moderate laxation; ?, indicates uncertainty as to laxation; −, indicates no laxation. Control diet is in heavy type.

RAT NUMBER	DIET	PER CENT OF WATER	RATIO OF WEIGHT OF RAT TO WEIGHT OF DRY FECES	SCORE
1	Diet I	**26.1**	**39.4**	
	Diet I	**23.1**	**40.6**	
	Diet I	**27.6**	**43.3**	
	Diet I	**27.2**	**44.4**	
	Diet I	**29.0**	**42.8**	
	Diet I (1 week)	**29.9**	**52.2**	
	Diet I	**28.0**	**51.0**	
2	Diet I	**23.7**	**37.5**	
	Diet I	**24.1**	**40.9**	
	Diet I	**24.6**	**42.8**	
	Diet I	**30.6**	**41.5**	
	Diet I	**28.2**	**42.0**	
	Diet I (1 week)	**31.9**	**46.1**	
	Diet I	**36.4**	**49.2**	
3	Diet I + 0.6 gm. bran	23.6	26.2	++
	Diet I + 1.2 gms. bran	22.4	30.1	+
	Diet I + Ash of 1.2 gms. bran	21.5	44.1	−
	Diet I + Leached bran from 1.2 gms. bran	17.9	35.2	+
	Diet I + Ash of 0.6 gm. bran + 0.34 gm. filter paper	17.0	38.7	+
	Diet II + 1.2 gms. bran	18.2	48.1	−
	Diet I	**26.3**	**51.3**	
	Diet I + 12 drops milk of magnesia	36.3	50.8	
	Diet I + 2.4 gms. bran	29.0	33.1	+
4	Diet I + 0.6 gm. bran	26.2	23.8	++
	Diet I + 1.2 gms. bran	27.4	24.8	++
	Diet I + Ash of 1.2 gms. bran	18.1	41.3	−
	Diet I + Leached bran from 1.2 gms. bran	18.6	27.3	+
	Diet I + Ash of 0.6 gm. bran + 0.34 gm. filter paper	17.3	28.7	+
	Diet II + 1.2 gms. bran	26.2	36.3	+
	Diet I	**21.0**	**45.0**	
	Diet I + 12 drops milk of magnesia	35.3	39.7	?
	Diet I + 2.4 gms. bran	27.2	23.7	++

TABLE 6—*Continued*

RAT NUMBER	DIET	PER CENT OF WATER	RATIO OF WEIGHT OF RAT TO WEIGHT OF DRY FECES	SCORE
5	Diet I + 1.2 gms. bran	36.1	23.7	++
	Diet I + Ash of 1.2 gms. bran	26.0	35.5	−
	Diet I + Leached bran from 1.2 gms. bran	30.1	28.8	+
	Diet I + Ash of 0.6 gm. bran + 0.34 gm. filter paper	25.8	28.9	+
	Diet II + 1.2 gms. bran	38.2	37.1	−
	Diet I	**37.7**	**38.5**	
	Diet I + 3¼ cc. senna tea	36.0	42.9	−
	Diet I + 2.4 gms. bran	38.9	30.0	+
6	Diet I + 1.2 gms. bran	24.8	27.0	++
	Diet I + Ash of 1.2 gms. bran	22.2	39.5	−
	Diet I + Leached bran from 1.2 gms. bran	22.3	27.9	+
	Diet I + Ash of 0.6 gm. bran + 0.34 gm. filter paper	15.0	30.7	+
	Diet II + 1.2 gms. bran	23.7	35.5	?
	Diet I	**26.1**	**46.8**	
	Diet I + 3¼ cc. senna tea	32.4	35.2	?
7	Diet I + 1.2 gms. bran	29.9	21.5	++
	Diet I + Leached bran from 1.2 gms. bran	28.6	22.4	++
	Diet I + Ash of 1.2 gms. bran	20.4	33.9	−
	Diet I + 1.2 gms. bran biscuit	25.6	24.6	++
	Diet II + 0.6 gm. bran	29.2	35.5	−
	Diet I	**25.6**	**39.8**	
	Diet I + 0.5 gm. Boal's Roll	27.1	37.4	−
	Diet I + 2.4 gms. bran	32.7	22.6	++
8	Diet I + 1.2 gms. bran	29.5	30.9	++
	Diet I + Leached bran from 1.2 gms. bran	32.6	33.3	++
	Diet I + Ash of 1.2 gms. bran	32.2	43.4	?
	Diet I + 1.2 gms. bran biscuit	37.4	34.1	+
	Diet II + 0.6 gm. bran	35.2	51.9	−
	Diet I	**34.6**	**53.7**	
	Diet I + 0.5 gm. Boal's Roll	32.0	55.3	−
	Diet I + 2.4 gms. bran	38.0	41.5	+
9	Diet I	**24.3**	**37.3**	
	Diet I	**21.6**	**44.1**	
	Diet I	**19.3**	**45.9**	
	Diet I	**23.4**	**43.4**	
	Diet II	23.1	71.5	−
	Diet I (1 week)	20.8	50.1	
	Diet I + 3¼ cc. senna tea	34.2	43.8	

TABLE 6—*Continued*

RAT NUMBER	DIET	PER CENT OF WATER	RATIO OF WEIGHT OF RAT TO WEIGHT OF DRY FECES	SCORE
10	Diet I + 0.6 gm. bran	24.4	34.5	++
	Diet I + Leached bran from 0.6 gm. bran	23.9	37.6	++
	Diet I + Ash of 0.6 gm. bran	22.5	49.5	−
	Diet I + 0.6 gm. bran biscuit	27.7	41.4	+
	Diet II + 0.6 gm. bran	25.2	59.2	−
	Diet I	**24.6**	**59.7**	
	Diet I	**24.9**	**57.9**	
11	Diet I + Ash of 0.6 gm. bran	25.2	42.3	?
	Diet I + Leached bran from 0.6 gm. bran	24.1	41.8	+
	Diet I + 0.6 gm. bran	21.5	43.9	+
	Diet I + Ash of 0.6 gm. bran and 0.34 gm. filter paper	20.1	36.5	+
	Diet II + 0.6 gm. bran	22.9	77.1	−
	Diet I	**25.5**	**56.1**	
	Diet I + 12 drops milk of magnesia	29.7	55.3	?
12	Diet I + Leached bran from 0.6 gm. bran	22.8	27.6	++
	Diet I + Ash of 0.6 gm. bran	22.6	38.2	?
	Diet I + 0.6 gm. bran	25.1	30.4	+
	Diet I + Ash of 0.6 gm. bran + 0.34 gm. filter paper	28.3	25.9	++
	Diet II + 0.6 gm. bran	20.9	46.6	−
	Diet I	**26.5**	**42.4**	
	Diet I	**28.1**	**46.9**	
13	Diet I + Leached bran from 0.6 gm. bran	21.2	28.3	++
	Diet I + Ash of 0.6 gm. bran	20.0	41.5	?
	Diet I + 0.6 gm. bran	23.0	37.6	+
	Diet I + Ash of 0.6 gm. bran + 0.34 gm. filter paper	24.2	32.7	+
	Diet II + 0.6 gm. bran	22.6	64.9	−
	Diet I	**23.0**	**61.2**	
	Diet I + 12 drops cascara	30.3	52.2	−
14	Diet I + 0.6 gm. bran	18.9	25.3	++
	Diet I + Leached bran from 0.6 gm. bran	21.8	27.8	++
	Diet I + Ash of 0.6 gm. bran	25.5	37.7	?
	Diet I + 0.6 gm. bran biscuit	28.6	34.3	+
	Diet II + 0.6 gm. bran	25.0	47.0	−
	Diet I	**27.3**	**44.0**	
	Diet I + 0.5 gm. Boal's Roll	27.9	43.7	−

TABLE 6—*Continued*

RAT NUMBER	DIET	PER CENT OF WATER	RATIO OF WEIGHT OF RAT TO WEIGHT OF DRY FECES	SCORE
15	Diet I + Ash of 0.6 gm. bran	18.5	31.6	+
	Diet I + Leached bran from 0.6 gm. bran	23.0	28.8	+
	Diet I + 0.6 gm. bran	24.3	30.0	+
	Diet I + Ash of 0.6 gm. bran + 0.34 gm. filter paper	20.5	27.1	+
	Diet II + 0.6 gm. bran	17.6	49.8	−
	Diet I	**23.1**	**44.7**	
	Diet I + 12 drops cascara	25.0	51.2	−
16	Diet I	**20.3**	**34.5**	
	Diet I	**22.8**	**38.6**	
	Diet I	**25.5**	**41.1**	
	Diet I	**21.9**	**44.2**	
	Diet II	21.8	57.9	−
	Diet I (1 week)	18.1	49.3	?
	Diet I + 3¼ cc. senna tea	30.9	45.8	−
17	Diet I	**21.9**	**35.7**	
	Diet I	**23.5**	**43.1**	
	Diet I	**22.1**	**47.4**	
	Diet I	**23.8**	**48.3**	
	Diet II	28.1	64.1	−
	Diet I (1 week)	23.6	66.2	?
	Diet I + 12 drops milk of magnesia	31.8	59.3	−
18	Diet I + Ash of 0.6 gm. bran	22.2	41.0	+
	Diet I + Leached bran from 0.6 gm. bran	23.9	38.9	+
	Diet I + 0.6 gm. bran	26.8	44.6	+
	Diet I + Ash of 0.6 gm. bran + 0.34 gm. filter paper	21.2	41.8	+
	Diet II + 0.6 gm. bran	22.6	56.1	−
	Diet I	**25.9**	**69.3**	
19	Diet I + Leached bran from 0.6 bran	21.0	32.7	++
	Diet I + Ash of 0.6 gm. bran	23.9	43.1	+
	Diet I + 0.6 gm. bran	25.7	41.2	+
	Diet I + Ash of 0.6 gm. bran + 0.34 gm. filter paper	21.9	41.8	+
	Diet II + 0.6 gm. bran	27.2	63.6	−
	Diet I	**27.8**	**62.0**	
	Diet III	27.6	102.0	−
	Diet IV + 2.4 gms. bran	26.9	74.1	−

TABLE 6—*Continued*

RAT NUMBER	DIET	PER CENT OF WATER	RATIO OF WEIGHT OF RAT TO WEIGHT OF DRY FECES	SCORE
20	Diet I + 0.6 gm. bran	25.6	29.0	++
	Diet I + Leached bran from 0.6 gm. bran	26.4	36.0	+
	Diet I + Ash of 0.6 gm. bran	22.3	48.1	−
	Diet I + 0.6 gm. bran biscuit	26.8	44.3	+
	Diet II + 0.6 gm. bran	28.9	65.1	−
	Diet I	**28.0**	**56.8**	
	Diet I + 0.5 gm. Boal's Roll	30.1	66.0	−
21	Diet I	**24.5**	**39.2**	
	Diet I	**24.4**	**43.7**	
	Diet I	**22.8**	**47.1**	
	Diet I	**25.8**	**49.3**	
	Diet II	28.2	76.9	−
	Diet I (1 week)	25.7	56.9	
	Diet I + 12 drops milk of magnesia	36.5	64.7	−
22	Diet I + Ash of 0.6 gm. bran	22.4	33.1	+
	Diet I + Leached bran from 0.6 gm. bran	35.4	31.7	+
	Diet I + 0.6 gm. bran	32.3	30.5	+
	Diet I + Ash of 0.6 gm. bran + 0.34 gm. filter paper	25.2	27.3	++
	Diet II + 0.6 gm. bran	25.9	53.9	−
	Diet I	**29.7**	**45.2**	
	Diet I + 3¼ cc. senna tea	30.0	44.8	−
23	Diet I + Leached bran from 0.6 gm. bran	19.4	26.3	++
	Diet I + Ash of 0.6 gm. bran	22.0	36.5	?
	Diet I + 0.6 gm. bran	20.1	30.6	++
	Diet I + Ash of 0.6 gm. bran + 0.34 gm. filter paper	17.4	27.3	++
	Diet III + 0.6 gm. bran	23.5	51.8	−
24	Diet I + 0.6 gm. bran	19.7	27.4	++
	Diet I + Leached bran from 0.6 gm. bran	30.5	28.5	++
	Diet I + Ash of 0.6 gm. bran	20.9	41.0	−
	Diet I + 0.6 gm. bran biscuit	31.9	32.9	+
	Diet II + 0.6 gm. bran	24.7	44.2	−
	Diet I	**31.8**	**44.8**	
	Diet I	**31.0**	**48.3**	

TABLE 6—*Continued*

RAT NUMBER	DIET	PER CENT OF WATER	RATIO OF WEIGHT OF RAT TO WEIGHT OF DRY FECES	SCORE
25	Diet I	**14.2**	**36.3**	
	Diet I	**13.9**	**37.6**	
	Diet I	**13.9**	**36.8**	
	Diet I	**15.9**	**38.7**	
	Diet II	17.3	58.9	−
	Diet I (1 week)	21.7	42.3	
	Diet I + 12 drops cascara	30.9	40.3	−
26	Diet I + 0.6 gm. bran	17.0	24.4	++
	Diet I + Leached bran from 0.6 gm. bran	17.9	28.2	+
	Diet I + Ash of 0.6 gm. bran	16.5	36.2	−
	Diet I + 0.6 gm. bran biscuit	19.5	29.2	+
	Diet II + 0.6 gm. bran	19.5	40.8	−
	Diet I	**23.7**	**39.4**	
	Diet I + 0.5 gm. Boal's Roll	23.2	43.8	−
27	Diet I + Ash of 0.6 gm. bran	16.7	32.6	+
	Diet I + Leached bran from 0.6 gm. bran	19.5	28.8	++
	Diet I + 0.6 gm. bran	18.2	30.4	+
	Diet I + Ash of 0.6 gm. bran + 0.34 gm. filter paper	15.0	26.5	++
	Diet III + 0.6 gm. bran	20.7	49.1	−
	Diet I	**24.5**	**41.1**	
	Diet III	29.2	67.2	−
	Diet IV + 2.4 gms. bran	31.0	31.8	+
28	Diet I + Leached bran from 0.6 gm. bran	23.7	23.2	++
	Diet I + Ash of 0.6 gm. bran	23.6	35.7	−
	Diet I + 0.6 gm. bran	22.4	28.8	++
	Diet I + Ash of 0.6 gm. bran + 0.34 gm. filter paper	16.9	26.5	++
	Diet III + 0.6 gm. bran	18.4	51.4	−
	Diet I	**25.3**	**42.4**	
	Diet III	22.8	82.4	−
	Diet IV + 2.4 gms. bran	19.8	29.1	++
29	Diet I + Ash of 0.6 gm. bran	22.4	33.2	++
	Diet I + Leached bran from 0.6 gm. bran	27.4	32.5	++
	Diet I + 0.6 gm. bran	22.6	38.1	+
	Diet I + Ash of 0.6 gm. bran + 0.34 gm. filter paper	20.6	35.0	+
	Diet III + 0.6 gm. bran	19.8	66.3	−
	Diet I	**22.8**	**58.4**	
	Diet III	24.1	101.1	−
	Diet IV + 2.4 gms. bran	27.2	47.0	+

TABLE 6—*Concluded*

RAT NUMBER	DIET	PER CENT OF WATER	RATIO OF WEIGHT OF RAT TO WEIGHT OF DRY FECES	SCORE
30	Diet I + Leached bran from 0.6 gm. bran	23.6	26.9	++
	Diet I + Ash of 0.6 gm. bran	22.4	37.0	+
	Diet I + 0.6 gm. bran	26.8	34.9	+
	Diet I + Ash of 0.6 gm. bran + 0.34 gm. filter paper	22.6	29.9	+
	Diet III + 0.6 gm. bran	25.6	57.7	−
	Diet I	**31.4**	**47.1**	
	Diet III	27.2	84.7	−
	Diet IV + 2.4 gms. bran	29.7	39.8	++
31	Diet I + 0.6 gm. bran	27.9	20.5	++
	Diet I + Leached bran from 0.6 gm. bran	28.1	24.1	++
	Diet I + Ash of 0.6 gm. bran	18.4	32.2	?
	Diet I + 0.6 gm. bran biscuit	21.5	28.2	+
	Diet II + 0.6 gm. bran	20.1	37.8	−
	Diet I	**20.8**	**38.8**	
	Diet I	**22.1**	**40.7**	
32	Diet I	**15.9**	**34.4**	
	Diet I	**14.9**	**36.0**	
	Diet I	**16.8**	**37.7**	
	Diet I	**18.7**	**38.6**	
	Diet II	17.8	56.5	−
	Diet I (1 week)	23.2	44.7	
	Diet I + 12 drops cascara	23.8	48.6	−

SUMMARY

These studies of the laxative effect of a preparation of bran steamed and crumbled for human use may be summarized briefly as follows:

I. Thirty-two albino rats have been fed through 3-week periods (1) an adequate basal ration, (2) the basal ration plus the bran preparation in doses of 0.6, 1.2 and 2.4 gms., (3) the basal ration plus corresponding quantities of leached bran, (4) the basal ration plus the ash of the varying quantities of bran, (5) the basal ration plus filter paper equal to the weight of the leached bran plus the corresponding bran ash. The bran has proven definitely laxative in doses of 0.6 gm.; the leached bran and the filter paper almost equally effective, but the ash negative.

II. When basal rations low in vitamin B have been substituted for the adequate basal ration, it has required as much as 1.2 gms. of bran to produce a laxative effect. With a basal ration lacking vitamin B entirely, 2.4 gms. of bran have been necessary to gain laxation. It may be con-

cluded that the addition of bran to diets low in vitamin B will cause laxation from the combined effect of fiber and vitamin B.

A comparison of the effect of bran with common laxatives, milk of magnesia, cascara, senna tea and a vegetable-fruit paste, has shown that the quantities given had not so much effect as 0.6 gm. of bran, except in case of milk of magnesia, which tended to increase the water output.

III. In case of 38 girls from 10 to 16 years of age living in an excellent institution where the life was regular and the diet adequate, the addition daily of 14 gms. (2 tablespoonfuls) of prepared bran to the breakfast cereal over a period of 4 weeks has resulted in definitely increased laxation, in 50 per cent of the cases, as judged by the reports of the number of defecations daily. In 15 per cent the bran appeared to have no effect, and in 35 per cent of the cases the results were difficult to classify as definitely positive or negative.

IV. In 4 studies made on healthy adult women a fore period of one week without bran was compared with similar periods at the end of one and two months respectively during which 34 grams of bran were added daily to the diet. The weight of both wet and dry feces was increased in every case and the texture of freshly collected feces was softer. In a fifth case, the bran proved too laxative and the experiment was discontinued at the end of the sixth week. In all the other cases, the response to bran appeared to be just as satisfactory in the second month as the first.

V. Histological studies of the alimentary tracts of 24 rats were made, 2 rats being on an adequate diet without bran for eight months; 4 rats on an adequate diet plus 0.6 gm. of bran for 4 months; 6 rats on an adequate diet plus 1.2 gms. of bran, 2 for 8 weeks, 2 for 12 weeks and 2 for 16 weeks respectively; 6 rats on an adequate diet plus leached bran from 1.2 gms. bran treated similarly to the 6 above; and 6 on a diet lacking vitamin B plus 1.2 gms. of bran also treated like those above. In no case was there any sign of pathological lesions.

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QUALITY STUDIES OF THERAPEUTIC DIETS: II. THE NEPHRITIC DIET

A Committee Report[1]

SISTER M. VICTOR, Chairman

THE study here reported was undertaken with the purpose of determining the nutritional quality of nephritic diets as commonly employed. The question to be answered was: Are diets that are planned to fit the various dietary prescriptions adequate in all essentials?

The study was begun by collecting copies of nephritic diets from twenty outstanding hospitals. These were then analyzed for their nutritional value according to Sherman's (1) dietary standards:

1. Calories sufficient to preserve standard body weight while sustaining the desired amount of activity. The average requirement is between 1800 and 3500 calories.
2. Protein adequate in quantity and quality. An allowance of one gram of protein daily per kilogram of body weight, about 70 grams per average man.
3. Vitamins in adequate amounts. "The presence of sufficient amounts is best assured by giving ample prominence to those foods known to be good sources; notably, milk and its products, eggs, vegetables, and fruits."
4. An adequate supply of inorganic elements, especially phosphorus, calcium and iron. The standard allowance is: phosphorus, 1.32 grams; calcium, 0.68 gram; iron, 0.015 gram.

The following information was obtained from the diets submitted for study:

1. The protein content ranged from 20 to 70 grams. Six of the diets contained 20 to 35 grams, nine contained 40 to 55 grams and five contained 60 to 70 grams (Table 1). In almost every instance a good quality of protein was chosen. Most of the diets were planned in such a way that approximately one-half of the protein was given in the form of milk, eggs, and meat; the remainder was provided in fruits, vegetables, and cereal products.

[1] This study was conducted as a part of the Diet Therapy Section Program for the year 1930–31. Received for publication, May 14, 1932.

2. Carbohydrate and fat calories were used generously as protein sparers. Except for one or two instances, no mention was made of caloric adjustment for individual needs, i.e. increased for the underweight patient and decreased for the overweight patient.

3. The vitamin content was adequate because in practically all the diets vegetables and fruits, butter and cream were included in generous amounts.

TABLE 1

Kinds and approximate amounts of foods chosen for each group of diets

FOOD	DIETS CONTAINING 20 TO 35 GRAMS PROTEIN		DIETS CONTAINING 40 TO 55 GRAMS PROTEIN		DIETS CONTAINING 60 TO 70 GRAMS PROTEIN	
	Serving portions					
	Least number of	Largest number of	Least number of	Largest number of	Least number of	Largest number of
Milk (glasses)	0	1	1	2	1	4
Cream (glasses)	¼	¾	¼	1	½	¾
Eggs	0	1	0	2	0	2
Meat and fish	0	0	0	1	0	1
Potatoes	1	2	1	2	2	2
Vegetables	2	4	2	4	4	4
Fruit	1	4	2	3	2	3
Bread (slices)	2	4	3	6	3	4
Cereal	1	2	1	2	1	1
Puddings	0	1	0	1	0	1
Butter (squares)	4	As desired	2	As desired	3	As desired
Mayonnaise (tablespoons)	1	2	0	1	0	2
Jelly or jam (tablespoons)	2	As desired	0	As desired	0	As desired
Fruit juice (glasses)	0	1	0	2	0	3

Note: The figures in the left hand column indicate the least number of serving portions in any diet falling within the group, the figures in the right hand column the largest number. The term "serving portions" is used because some of the diet plans did not indicate the weight or measure of the servings.

4. The study showed that the mineral content depends upon the protain content and in diets with less than 40 grams of protein, it was markedly inadequate. Likewise many of the diets with 40 grams of protain contained insufficient amounts of all three elements. A few of these, however, yielded enough calcium but were low in phosphorus and iron.

It was apparent that attention needed to be focused on the mineral content of nephritic diets. Forty grams of protein being a common

prescription, a study was made with a view to securing adequate mineral content in this limited diet. We constructed Table 2, showing the amount of calcium, phosphorus and iron contributed by portions of various foods containing approximately 6 grams of protein, and we used this table in planning sample dietaries.

In Table 3 is suggested a satisfactory diet plan with 40 grams of protein (Diet No. 1). Three servings (100 grams each) of fruit, four servings (100 grams each) of vegetables, and two servings of potato, bread and cereal, contribute approximately 18 grams of protein. The remaining 24 grams were added in the form of 100 grams of cream, 300 grams of milk and two eggs. Such a diet shows an adequate calcium supply, but a low iron content and a very marked deficit of phosphorus. The iron can be increased by including each day one of the green leafy vegetables.

TABLE 2

*Mineral content of amounts of food containing approximately 6 grams of protein**

FOOD	GRAMS	CALCIUM	PHOSPHORUS	IRON
		grams	*grams*	*grams*
Eggs, one		0.0330	0.0900	0.00126
Milk	200	0.2400	0.1860	0.00048
Cheese (cheddar)	20	0.1862	0.1366	0.00027
Bacon (cooked)	25	0.0016	0.0430	0.00050
Meat (beef, misc. cuts)	25	0.0032	0.0602	0.00102
Fish (white)	25	0.0375	0.0657	0.00010
Liver (calves, uncooked)	30	0.0033	0.0615	0.00162
Oysters	100	0.0520	0.1550	0.00314

Peaches or apricots (2) supply iron in a form readily assimilated and produce a much greater regenerative activity as far as hemoglobin building factors are concerned, than do the vegetables which may contain a higher iron content. In view of the fact that most cases of chronic nephritis have more or less anemia it would seem especially important that the diets should be adequate or even contain an excess of hemoglobin building factors. The phosphorus, however, cannot be brought up to the standard requirement. Even though 400 grams of milk were given in place of the two eggs, the phosphorus would still be low. Furthermore, such a substitution would decrease the iron content, an inadvisable procedure. Whole wheat bread in place of white bread will add to the mineral supply to a small extent. The choice of fruits and vegetables does not influence the phosphorus content to any appreciable extent.

A diet with 50 grams of protein (Table 3, Diet No. 2) was constructed

TABLE 3

FOOD	TOTAL GRAMS	CARBO-HY-DRATE	PRO-TEIN	FAT	CALCIUM	PHOS-PHORUS	IRON
		grams	*grams*	*grams*	*grams*	*grams*	*grams*
Diet No. 1: 40 grams protein and 1800 calories							
Fruit, 10 per cent (orange)	100	10	1	—	0.0450	0.0200	0.00066
Fruit, 15 per cent (raspberries)	100	15	1	—	0.0490	0.0520	0.00099
Fruit, 15 per cent (pear)	100	15	1	—	0.0150	0.0260	0.00046
Vegetable, 5 per cent (cauliflower)	100	3	1	—	0.1230	0.0610	0.00143
Vegetable, 5 per cent (string beans)	100	3	1	—	0.0460	0.0520	0.00110
Vegetable, 5 per cent (tomato)	50				0.0050	0.0130	0.00030
Vegetable, 5 per cent (head lettuce)	50	3	1	—	0.0215	0.0210	0.00021
Vegetable, 10 per cent (carrots)	100	6	1	—	0.0560	0.0460	0.00107
Vegetable, 20 per cent (white potato)	200	40	4	—	0.0280	0.1160	0.00170
Cereal (cornflakes)	15	12	2	1	0.0030	0.0285	0.00037
Bread (white)	60	32	5	1	0.0160	0.0560	0.00060
Sugar	20	20	—	—			
Jelly	15	12	—	—	0.0022	0.0015	0.00075
Mayonnaise	30	—	—	26	0.0021	0.0054	0.00007
Butter	30	—	—	26	0.0030	0.0060	0.00006
Cream, 20 per cent	100	5	3	20	0.0860	0.0670	0.00020
Milk	300	15	9	12	0.3600	0.2790	0.00072
Eggs (2)		—	12	12	0.0660	0.1800	0.00252
		191	42	98	0.9268	1.0304	0.01321
Diet No. 2: 50 grams protein and 2000 calories							
Milk	300	15	9	12	0.3600	0.2790	0.00072
		206	51	110	1.2868	1.3094	0.01393
Diet No. 3: 60 grams protein and 2500 calories							
Bread (white)	20	11	2	—	0.0053	0.0190	0.00020
Jelly	15	12	—	—	0.0022	0.0015	0.00075
Sugar	15	15					
Butter	20	—	—	17	0.0020	0.0040	0.00004
Cream, 20 per cent	50	2	2	10	0.0430	0.0335	0.00010
Egg (1)		—	6	6	0.0330	0.0900	0.00126
		246	61	143	1.3723	1.4574	0.01628

* Mineral content of foods, in both tables, is taken from Sherman, *Chemistry of Food and Nutrition*, and Waller, *Nutritive Value of Foods*.

by adding 300 grams of milk to the diet containing 40 grams of protein. This makes the phosphorus content barely adequate. The addition of an egg instead of the milk would leave the phosphorus still far below the accepted normal requirement.

A diet with 60 grams of protein (Table 3, Diet No. 3) was made by adding bread, cream and one egg to the second diet. These additions make the mineral content adequate with a fairly good margin of safety and allow a wider choice of protein foods. Substitutions for one or two of the eggs may be made without imperiling the phosphorus content. The amount of vegetable may be decreased in this diet, and simple desserts, such as cornstarch puddings, may be used in place of fruit.

The caloric value can be readily adjusted by the addition or subtraction of sugar, jelly, fruit juices, butter and mayonnaise, without changing the protein content and without affecting the mineral content.

The diet prescription for nephritis frequently includes restrictions of salt and water and often specifies the final reaction of the diet. The restriction of sodium chloride is not likely to affect the nutritional value of the diet, though fluid restrictions may have some influence on its adequacy since a limited fluid intake may necessitate a decrease in the amount of milk used and this in turn would bring about a reduction of the mineral content. The final reaction of the diet, i.e. whether it be acid, alkaline or neutral (3) depends to some extent upon the kinds and amounts of fruits and vegetables chosen, but to a larger extent upon the kind and amount of protein.

SUMMARY

Nephritic diets if carefully planned will conform to present dietary standards in respect to *calories* and *vitamins*. The *mineral* content should be carefully considered. It is directly dependent upon the protein content and is little affected by the caloric value. Diets with *less* than 40 grams of protein cannot supply an adequate mineral content. Diets containing 40 to 50 grams of protein can be planned to contain adequate calcium, but are low in phosphorus and iron. The best solution seems to be to give one-half the protein in the form of milk and eggs (300 grams milk and two eggs) and to include one green leafy vegetable. This provides adequate calcium and iron to cover the estimated needs, but with little or no margin. There is apparently no way of making the phosphorus content adequate in a diet containing 40 grams of protein or less. Diets with 50 to 60 grams of protein can be planned to contain just barely sufficient phosphorus if they are constructed so as to include 300 grams of milk. Diets with 60 grams or more of protein can be fully adequate in mineral content as well as in all other respects. A résumé of the findings appear in Table 4.

TABLE 4

Comparison of nephritic diets with present dietary standards

THE OPTIMUM DIET	NEPHRITIC DIETS
Nutritional factors of fundamental importance:	The nutritional factors of fundamental importance can be supplied as follows:
1. Calories—Sufficient to maintain normal body weight. Average requirement, 1800 to 3500 calories.	1. Calories—The desirable amount can readily be supplied by regulating the amount of foods containing concentrated amounts of carbohydrate and fat such as sugar, fruit juices, jelly, butter and mayonnaise.
2. Protein—Adequate in quantity and quality: Quantity— Minimum, $\frac{2}{3}$ gm. per kg. Average, 1 gm. per kg. Quality— Best sources—milk, eggs, cheese and meat.	2. Protein— Quantity— Varies with the diet prescription Quality— Diets can be planned to contain protein from the best sources.
3. Vitamins—"The presence of sufficient amounts of vitamins is best assured by giving ample prominence to those foods which are known to be good sources, notably milk and its products, eggs, vegetables and fruit."	3. Vitamins—Can be furnished in sufficient amounts, since milk, cream, butter, vegetables and fruit may be used in adequate amounts unless the caloric value must be kept low. In such a case care must be exercised to supply the proper amount of the fat soluble vitamins.
4. Mineral Salts—Sufficient in amounts. Calcium..... 0.68 gm. Phosphorus..... 1.32 gm. Iron..... 0.015 gm.	4. Mineral Salts—The mineral content depends upon the protein allowance: a. Diets with *less* than 40 gm. protein cannot supply an adequate mineral quota. b. Diets with 40 gm. to 50 gm. protein can be planned to contain adequate Ca. but are low in P and Fe. The best plan is to give $\frac{1}{2}$ the protein in the form of milk and 2 eggs, and to include one green leafy vegetable. Such a plan will give adequate Ca., just enough Fe to cover the estimated needs but with little or no margin. The P content cannot be made adequate. c. Diets with 50 to 60 gm. of protein, if constructed by adding 300 gm. milk to the diet with 40 gm. protein, will become barely adequate in P. d. Diets with 60 gm. or more of protein can be fully adequate.

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METHODS OF DETERMINING EFFECTIVENESS OF CLINICAL TEACHING[1]

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BEDSIDE teaching implies the correlation of theoretical knowledge with practical experience. Grades have been accepted as ratings of ability in classroom teaching, but there seems to be no yardstick for measuring the correlation between theoretical learning and its practical application.

The value of clinical teaching was appreciated by Osler when he said, "For the student of Medicine and Surgery, it is a safe rule to have no teaching without a patient as a text and the best teaching is taught by the patient himself." Motivation for learning is a recognized method of teaching, and one of the fundamental principles of education is not to teach students what to think, but to develop reason and judgment.

In teaching the student nurse there are many problems, but the goal on which all instructors and supervisors should focus has been described in the words of Law (1) as beyond the hospital routine, and toward her professional life where she may prove herself capable of caring for the sick in such a manner that human life will be safeguarded to the utmost extent, as far as her responsibility is concerned.

Christian (2) has emphasized that "It must be remembered that the first concern of every hospital should be the best possible care of the patient." The physician and interne, nurse and student-nurse, dietitian and junior dietitian all play a part in that care. As a dietitian, I am qualified to speak of only one phase in that cycle, the nutritional. However, nutrition is but one phase of medical care and the supervisor of medical nursing and the dietitian must coöperate closely to follow the students during this clinical period. The dietitian can measure the ability of each student by judging concrete responsibilities, but the abstract qualities of aptness, tact, and diplomacy in her contacts with the patient during her dietetic service must be observed by the nursing rather than the dietetic supervisor.

Human relationships are a dominant factor in every aspect of educa-

[1] Presented before the Michigan League of Nursing Education, March, 1932.

tion, but in no place are they more intricate or more important than in the hospital field. The same principles of organization may be applied to the hospital field as to the hotel, department store, or industrial organization. These large organizations have realized the value of education in every phase of production, and apply certain apprenticeship principles of training to the tradesman and the college graduate. Clinical experience may be likened to an apprenticeship, but the old idea of "passing on" methods has been shown to be wasteful, uncertain, and without uniformity. Group teaching of uniform principles followed by intelligent supervision and direction with a satisfactory method of evaluating the results is a sound economic principle of any type of organization.

The causes of waste in production in large organizations have been defined as follows (3): lack of physical equipment; lack of accident prevention; nervous strain—fear and worry; effect of personality reactions and misunderstandings; right and wrong supervision; lack of incentive, appreciation or reward; labor turnover; and lack of open-mindedness.

When the student comes to the dietetic service for an apprenticeship or laboratory training, adequate provision has been made in theoretical knowledge. Dietetics is a correlation of physiology and biological chemistry interpreted in the food laboratory in attractive, palatable meals. Unless adequate physical equipment has been provided along with a definite plan of routine to be followed, much waste of time and energy will result. The student should be provided with a minute outline of routine procedures and a work-sheet detailing the responsibilities, but the necessary equipment must also be provided so that time will not be wasted in assembling the supplies necessary to undertake this work. Contact with the patient correlates the laboratory theory and the patient's reaction. It offers an opportunity for intelligent teaching of the diet and motivation for learning.

Accidents will happen in any organization, but are usually the fault of the organization rather than of the individual. Methods of preparation should be standardized. A good example of standardization has been used in planning and preparing weighed diets. All salads, vegetables and desserts are one hundred gram portions. This reduces the possibility of error in case the wrong salad is put on a tray, and reduces the number of varied portions which have to be considered in planning, weighing, checking, serving and in replacements. The student learns a standardized method in planning, and adapts that to the other steps as mentioned. This reduces the amount of supervision necessary, with the minimum of error.

Fear and worry undermine interest and efficiency. Fear does increase production temporarily, but as a continuing influence it inhibits sincere effort, destroys morale and impairs true efficiency. Worry varies with the temperament of the individual, but usually concerns itself with a feeling of failure in the undertaking. It is a part of every individual's makeup and should be understood and obviated as much as possible. Human happiness has been defined (3) as "the expression of satisfaction of those fundamental cravings the normal person has as a human being, for achievement, for freedom from fear, for reasonable leisure, and a sense of worthwhileness." It is present in every individual, regardless of his station in life; if he acquires a sense of worthwhileness the organization acquires an efficient, loyal employee. The results of an individual's accomplishments may receive a biased judgment unless the critic possesses this objective point of view.

Personality reactions and misunderstandings are a part of the intricacies of human relationships, but are not impossible of solution. Is the reaction or misunderstanding the result of the attitude of the student or of the supervisor? An understanding of people is only acquired with intelligent training and age. Gardner and Pierce (4) have emphasized the student's point of view. Serious damage may be done to the mental health of the young student unless the supervisor attempts to understand the capacities and temperament of the individual, thereby giving the student an opportunity to eradicate the situation. The director of any group of people must have an objective point of view, be concerned with teaching and helping the individual, have ability to standardize the routine, to study results, and be free from personality reactions.

Supervision is necessary to determine accurate production, but may be good or bad. A lack of confidence and feeling of distrust breeds fear and distrust. A child innocently exemplified this to his mother in the following incident. He was holding a package of eggs, and his mother sharply said, "Johnny, don't drop those eggs!" Whereupon, Johnny excitedly dropped the eggs, and said "Mother, I wouldn't have dropped those eggs if you hadn't mentioned it to me." Supervisors should be inspirational as well as informational. The student should be inspired with confidence, a sense of security in her responsibilities and with appreciation of achievement. If during the service three trays a day are served to a patient for fourteen days, and at one meal a tray is served to the wrong patient, it is a serious mistake; the cause, however, should be thoroughly investigated and a better plan of checking instituted. The entire emphasis should not be concentrated on the student who has shown one error in

fifty-one undertakings, or 1.9 per cent of error, when perhaps the routine of supervision had not been standardized sufficiently to eliminate as much as possible such a situation. Should the student leave the service with an utter feeling of failure? If a serious error occurs, the student enters upon the next service very much disturbed that she may make another mistake which may cause her dismissal. Fear and punishment are poor deterrents, but education and understanding may develop that student into an exceptionally efficient and successful graduate in later years.

The responsibility of supervision in any organization should only be given to one with an unusual personality, endowed with a broad knowledge of the problem and an understanding of human relationships. The supervisor must possess: (1) an appreciation of the student; (2) an interest in teaching; (3) a thorough knowledge of the subject matter; (4) a constant interest in learning; (5) initiative; (6) courage to promote new ideas; (7) the psychology of analysis; (8) judgment and common sense; (9) tact; and (10) diplomacy. Possession of these qualities will promote: (1) an understanding of the unusual capacities of the individual student; (2) a development of these capacities; (3) an improvement in the student's weak points; (4) high standards of achievement; (5) an ability to associate the problem with the patient; (6) investigation of new methods of teaching; (7) a lessened necessity for discipline; and (8) an efficient plan of production as well as a progressive plan of education.

Titus (5) has emphasized the fact that "Every nurse must be properly prepared for health nursing, as well as for sick nursing, and that every student must be given a clear understanding of community health problems as they are found outside as well as inside the hospital." The medical and allied professions have recognized the value of a well-organized program of preventive medicine, and the nurse has an educational responsibility in teaching sound principles of health hygiene and nutrition. This is not only the responsibility of the public health nurse, the visiting nurse, and the nurse in the educational field, but the hospital nurse and the industrial nurse can do much, particularly in this period of low incomes, to promote the best possible health and food habits under existing conditions. All phases of nursing coöperate in the program of preventive medicine, and last, but not least, is the private duty nurse who knows the intimacy of the family life, who often has a clearer view of distressing problems and is in a position to give more constructive information regarding good health and food habits than anyone else.

Economic status of the family does not necessarily manifest good

nutrition and hygiene. It is a well-known fact that there are as many cases of malnutrition among the middle and wealthy classes as among the poor. The private duty nurse should be a coöperative teacher toward not only the patient and family in the hospital, but toward the family at home. Tactful discussion of scientific facts with guidance toward good reference reading are always stimulating to intelligent people and prevent the antagonisms of dogmatic statements.

All that has been discussed so far is not new, but is an emphasis of the standards by which the student is to be measured.

The effectiveness of clinical teaching concerns itself with a study of the concrete and abstract measurements of the student's ability. The concrete measurement may be observed by supplying the student with an experience record and case histories which will emphasize the following facts:

1. Problem, patient, and physician concerned, this correlates the physician's knowledge and teaching as well as the student's theoretical knowledge
2. Equipment required to perform the problem, this emphasizes the necessity of having the complete equipment before beginning the work and saves time and distraction
3. Routine involved, this teaches a standardization of methods
4. Application of theory, a later teaching project is an excellent demonstration of the student's ability to interpret the theory and clinical training received.

The student can be graded later according to the accuracy with which these duties have been performed: time required; improvement shown with repetition of same responsibilities; initiative and accuracy in perceiving and undertaking new responsibilities; and application of constructive criticism. This experience record will serve as a check to assure the student, for a specified period of time, of an opportunity to receive all the clinical teaching which the service offers.

The evaluation of personal qualities is merely an expression of the judgment of the supervisor under whom the experience has been obtained. It carries with it the human element, and may or may not be fair depending on the supervisor's understanding of the student's capacities and their development. Final evaluation of the abstract achievements of the student should be made on the average from all services. If the student receives a rating of fair on two services with a rating of average in later services and excellent in her last services, improvement has been indicated. A statistical method can be determined in each unit for rating the

student. Statistics are not absolute, but merely a line of reasoning which shows a relative trend of improvement or otherwise and reduces the influence of personal reactions.

Emphasizing the ideals of achievement in clinical teaching is easier than evaluating the results obtained. The supervisor offering dietetic experience is in a position to determine the concrete accomplishments, and certain abstract qualities regarding rapidity of accomplishing certain responsibilities—improvement, judgment, reliability, and personality. Application of theoretical and clinical training is made at the bedside of the patient. The efficiency report from each nursing supervisor should cover the ability of the student to adapt nutritional education to the patient by instruction regarding selection of food from the house tray, or instruction regarding the special diet, and advice as to how the hospital procedure may be adapted to the family living conditions and budget.

Every student nurse is a potential teacher while in the dietetics department and has a part in the instruction of the patient in any variation of the normal diet. It is equally important that continuous instruction be given by the student not only in therapeutic, but also in house (normal) diets when in contact with the patient on any type of service. This interest in health education and use of theoretical knowledge should be observed and rated along with all the other factors which are judged in the contact between the student and the patient.

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STANDARDS FOR CANNED FOODS[1]

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DIETITIANS are vitally interested in buying commodities in accordance with standard specifications. Interest in buying on grade is perhaps greater now than it ever has been, owing to the fact that budgets must be watched so closely. The canning industry recognizes this interest and is anxious to give authentic information about canned food grading. Perhaps a résumé of the development of grading in the canning industry will help to clarify the situation.

The subject of grades is rather confusing. For years the canning industry and trade have generally recognized grades known as "Standard," "Extra-Standard," or "Choice," and "Fancy." Products falling below standard have been classed as "Seconds" or "Substandard." But while these grades were recognized and used, there were not precise definitions for them generally accepted all over the country. There were developed, however, through various state canners' associations, definitions and standards for products packed in certain sections, among them California, the Northwest States, Michigan and New York. It was easier to develop standards for a single region packing products with similar characteristics than to formulate standards applicable to products grown and packed all over the country.

The Federal Food and Drugs Act, as adopted in 1906, contained no requirement as to carrying the grade on the label of canned foods. The Federal Food Law enforcement officials have clearly recognized the big problem involved in formulating grades for the many different kinds of canned products, and the federal Government went no further than the work done by the joint committee on Definitions and Standards in formulating definitions and standards for the general guidance of food officials in enforcing the Food and Drugs Act. This committee has adopted standards for catsup, sauerkraut, fruit juices, tomato juice, jelly, jam and preserves, but not for other varieties of canned foods.

This was the situation up to some years ago when the National Canners Association organized a standing committee on definitions and standards

[1] Received for publication, May 11, 1930.

in an effort to get canners and the various producers to agree upon the basis for nationally recognized standards and grades. This committee did a large amount of work, and in coöperation with various government offices formulated definitions and standards for certain products and developed a score-card system for grading.

When the facilities provided for through the U. S. Warehouse Act became available to canners, the National Canners Association approved these tentative definitions and standards for experimental use and for application to government purchases and the administration of the Warehouse Act. Still later, when the Bureau of Agricultural Economics was authorized to extend its inspection service to canned fruits and vegetables, the definitions and grades used for the purpose of the Warehouse Act were adopted for this inspection service.

As previously stated, the Food and Drugs Act, adopted in 1906, contained no requirement for carrying the grade on the label. The grades under the Warehouse Act Administration and the marketing inspection service were established primarily for purposes other than labeling—chiefly to determine the value of the products in commercial transactions between canners and distributors.

The Bureau of Agricultural Economics of the U. S. Department of Agriculture has used the definitions and standards just mentioned as the basis for definitions and standards that were adopted tentatively for the administration of the Warehouse Act and the Marketing Inspection Service; these were established primarily for purposes other than labeling—chiefly to determine the value of the product in commercial transactions between canners and distributors. Tentative definitions and standards have been adopted by the Bureau of Agricultural Economics for lima beans, snap or string beans, beets, corn (cream style) corn (whole grain) peas, pumpkin and squash, spinach and tomatoes.

From time to time, the Army, the Navy and the Veterans' Bureau have adopted standards for supplies, including canned foods, purchased by them. During recent years, the Federal Specification Board, with headquarters in the Bureau of Standards, and composed of representatives from the several departments, has adopted Federal specifications for supplies to be purchased by the government departments.

When the American Dietetic Association met in 1930 the McNary-Mapes amendment to the Food and Drugs Act had been on the statute books but a few months. It had been signed by the President on July 8, 1930, and the Department of Agriculture had immediately started its study of regulations and standards contemplated under the new law.

But, as was foreseen by both the Department of Agriculture and the canning industry, the task of establishing standards and of formulating the necessary regulations proved both difficult and time consuming. It was not until the early months of 1931 that the regulations were formulated and the first set of standards announced. Up to the present time standards have been established for peaches, pears, apricots, cherries, peas and tomatoes. The law is operative on these products and will be extended to other canned foods just as rapidly as standards can be developed.

Perhaps some may feel that greater progress should have been made; although the McNary-Mapes amendment specifically excepts canned milk and canned meat products from its provisions because they are provided for under other laws, there are still many different kinds of canned foods for which standards must be formulated. An explanation of the situation—if an explanation is needed—will appear from a brief statement of the purpose of the law and the nature of the problem it presented to the Department of Agriculture.

The McNary-Mapes amendment is an addition to the misbranding section of the Food and Drugs Act. It provides that if a canned food falls below the standard of quality, condition and/or fill promulgated by the Secretary of Agriculture, and if its package or label does not bear a plain and conspicuous statement prescribed by the Secretary of Agriculture indicating that such product falls below the standard, it shall be considered misbranded and become subject to the penalties of the law for misbranding.

This amendment makes no change in the existing provisions against adulteration. It simply recognizes the fact that there are foods which are wholesome and nutritious, but which at the same time are inferior in quality. The new law is distinctly in the interest of the consumer; it is likewise a protection for the canner of good quality foods against competitors who may market inferior products under labels or by advertising that misleads the consumer.

The McNary-Mapes amendment provides for a single standard, or grade if that term may be used, for each product. It does not authorize nor require the Secretary of Agriculture to establish for each product a series of grades ranging from substandard to fancy. What it does, in fact, is to give the Department authority, by setting up a single standard, to draw a distinct line between foods of superior and of inferior quality.

It must also be kept in mind that the McNary-Mapes amendment to the Food and Drugs Act is a criminal statute. Consequently the stand-

ards and regulations promulgated under it must be such as can be enforced by action in a criminal court. The standards, for example, must be capable of demonstration by physical, chemical or other objective tests. They can not be based on intangible factors nor on individual opinions.

In its work on the standards for canned foods, the Department has constantly kept in mind the provision of the law that such standards shall be reasonable and such as will in the judgment of the Department "promote honesty and fair dealing in the interest of the consumer." The actual procedure in developing these standards reflects the desire of the Department to deal fairly with everyone concerned. After extensive study and tests of the product concerned, the Department draws up and makes public a tentative standard, and at the same time announces a public hearing at a date that will allow proper time for everyone interested to study the tentative standard. Consumers, dealers, canners, everybody in fact with an interest in the subject, is invited to the hearing.

After the public hearing the Department takes under consideration the suggestions and criticisms offered, makes such further studies as may be necessary, and then announces the final standard. These standards, as the law provides, become effective ninety days after their promulgation.

While the Secretary of Agriculture is given authority to alter or modify standards, it is certainly to the interest of both consumer and canner that such changes be kept to a minimum and that the standards as promulgated be such as will stand the test of both commercial usage and the courts.

As previously stated, standards have been promulgated for six products; work on others is progressing as rapidly as the time and the staff available at the Department will permit. It is a big task and one that will have far-reaching effect, for it will mean the raising of the general level of quality in canned foods, and at the same time will give the consumer complete protection against inferior products masquerading under deceptive labels. The law naturally has the support of the canning industry, because the industry asked for it and worked hard to secure its enactment.

The labels of canned foods falling below the standards promulgated under the McNary-Mapes law must bear this legend, "Below U. S. Standard," with a qualifying phrase which the Department of Agriculture directed should read "Low Quality but not Illegal." Various changes in this phrase were discussed at a hearing called by the Department of Agriculture in April, 1932, and it may be that the food officials will decide to

change the qualifying phrase, but at the date of writing no change has been announced.

On just what proportion of the apricots, cherries, peaches, pears, peas and tomatoes this label will be necessary, can not now be foreseen. At most, the proportion will be small. Why this is so is indicated by a recent statement made by the chief of one of the Food and Drug Administration offices in the East. Commenting on the quality of the 1931 tomato pack in his district he said: "Packers were unusually careful in putting up canned tomatoes this season as they have found no market for the substandard product to date. Having been notified of the provisions of the McNary-Mapes amendment, the canners were careful to put up a pack that would not require the substandard labeling provided under the law for tomatoes that do not meet the standard promulgated by the Secretary of Agriculture."

EDITORIAL

To Cook or Not to Cook

During the World War certain dietitians in service in France were mildly diverted when a communication was received from G. H. Q. that included a statement to the effect that "The dietitian is not a cook." These instructions were doubtless intended gently to convey the idea that the dietitian was purposed to be something of a minor executive and as such was not concerned herself with the active preparation of food. In many instances, however, army dietitians who served with the expeditionary forces can attest that the ability expertly to wield a spoon or a rolling pin at the fitting moment saved many a platoon of custards from an unhappy end. If her training had not been essentially practical, her usefulness in the days of smoky field ranges, recalcitrant army cooks and suspicious mess sergeants would have been definitely limited.

With her sister professional worker, the nurse, she endeavored to serve to her fullest capacity, keeping the same objective in mind, that of service to the patients and personnel for whom she was responsible. Seldom did her theoretical training in diet therapy need to be emphasized; her chief problems were how to vary the daily menu when her storeroom contained chiefly macaroni, corned beef, canned tomatoes, coffee, cereal and jam; and how to cajole cooks and humor mess sergeants (since her authority was passive rather than active) so that her objectives could be gained. She *had* to be a cook to succeed.

In the early days of home economics or "domestic science" training the emphasis was placed on cooking appetizing and edible food, with the primitive idea that man should enjoy his food in peace.

With the increasing interest and importance of diet therapy and nutrition, emphasis on cooking has been in some instances practically crowded out of the curriculum. Prospective administrative dietitians in training have been encouraged because of their proficiency in science, often irrespective of their ability in the arts and the correlation of mind and hand.

Criticism, even derogatory, may be stimulating, and today no profession escapes it. Much of it is justified, especially when directed toward the end product of the hospital kitchen—the patient's tray. In the May

Hospital Topics and Buyer, King laments the situation, frankly placing the blame at the dietitian's door, and offering as a certain cure the substitution of a skilled chef as manager of the food department. He states that cooking done by inexperienced or incompetent help working under the supervision of one not skilled in cooking, accounts for not a little of the insipid food now constituting a real liability in some hospitals. Divided authority in the food service department also contributes its share to inferior hospital cuisine. Good results can hardly be expected if the responsibility of handling food from the time it is purchased to the time it is served to the patient is split between several persons, independent of one another. He believes that hospital food service should be centrally organized under the supervision of an experienced executive chef.

The writer's argument is not new nor is it without a good basis. The moral is clear. The administrative dietitian should be a skilled cook, with a keen taste and liking for good food, a sharp eye and a trained nose, in addition to her other qualifications. In the larger hospitals, where a therapeutic or a teaching dietitian is available, there should be no excuse for an incompetent administrator. In the smaller hospitals where but one dietitian is employed, her responsibilities are truly heavy. In the classic words of Margaret Sawyer at the tenth anniversary meeting of the Association, she must be "the perfect dietitian—teacher, administrator, cook, all things to all men."

The Urgency of Nutritional Studies

Nutrition, cross-bred in its origin, related to practically every branch of biological science, is now recognized as a separate branch of applied science. Fletcher, writing in the January, 1932, number of *Nutrition Abstracts and Reviews*,[1] logically justifies the appearance of this recent addition to the ranks of scientific publications and emphasizes the importance to mankind of our present nutritional studies. He states that "A glance backwards in time shows that at every stage in the historical progress of natural knowledge, fresh advances have generally been the outcome of a rebel impertinence to the scheduled sciences established under customary names. Those investigations have been the most fertile that have disregarded the current boundaries of their nominal subjects and gone most freely outside them." The subject of nutrition is an

[1] Published by the Imperial Bureau of Animal Nutrition, The Reid Library, Rowett Institute, Aberdeen, Scotland.

inseparable part of physiology. It is a primary charge upon the biochemist. It is already one of the most progressive parts of pathology. It belongs obviously and equally to medicine and agriculture.

From a British viewpoint the writer states that "nutritional science as such has no separate academic status and no University chair,—perhaps fortunately." His justification for the separate collection and issue of *Nutrition Abstracts and Reviews* is found not in any considerations of abstract scientific thought, but simply in the immediate and far-reaching practical utility of the subject. This utility has come with almost unforeseen rapidity, and it calls for the ready dissemination of new knowledge with a special kind of urgency. The recent years of rapid progress in nutritional knowledge make a curious chapter in the history of science. It is curious because the order of events stands in such contrast with those we have been accustomed to see in the historical development of the physical sciences. Recent work in nutrition has shown that life may be rapidly disorganized in an animal by deprivation of any one among a number of specific items of its general diet, each almost ludicrously insignificant in the amount required, and of profound theoretical interest. There has been a succession of discoveries, each bringing a corresponding gain of practical utility.

We have the paradox that whereas our knowledge of some of the vitamins is already in familiar practical use we still have no notion of the place or mode of their action in the body, while of only one of them can it be said that we now probably know its chemical constitution and physical characters. A flood of new results is pouring in every day from the laboratories, the field stations, the hospitals, and the farms, where keen interest has been aroused either by the deep-seated physical and biological relations that are being revealed or by the new powers that are being given of practical control over health in animal and man. These results are coming in curiously mingled profusion. The workers are separated by space and by language, by the different disciplines of their laboratories, their farms, their hospitals, and by the various kinds of purpose they have in view.

Never has there been a more necessary or inevitable mating of what in the physical fields of work have been separated as "pure" and "applied" studies. Never has there been more difficulty, indeed, in distinguishing between what has theoretical interest and what has practical value. Pieces of work apparently most widely separated in aim or method may be among these giving mutually the most illumination.

Upon the quantitative side of human nutrition knowledge is attainable, of course, only by observation and trial of human diets. Even our first approaches to this empirical knowledge are scanty and incomplete, and they call urgently for more information and effort. As observation has to be made of diets voluntarily accepted, the factors of selective appetite and effective absorption, among countless others, will always be weightily involved. These factors depend directly upon the qualitative characters of the diet, and quantitative studies must be kept in constant renewal, as fresh light upon them is gained from advancing knowledge on the qualitative side.

Our qualitative knowledge of nutrition is fortunately based on direct experimental methods, and these within a period of less than twenty years have opened new chapters in biology, in medicine and in agriculture. As Sir Frederick Gowland Hopkins said in the first issue of this new publication, "The results of these studies sometimes awaken scepticism among those who have not appraised the evidence. They are conclusive, however, to those who have seen them at first-hand." A journal of this kind, if it does nothing else, will perform a great service if it tends to reduce the present gap between the workers gaining the new experimental results and those who have to find and make their application in practical life.

Among those especially concerned with the application of nutritional studies are the medical practitioner, who may more effectively bring to the service of man the new fundamental knowledge that is now being opened; the surgeon, concerned with the regrowth of bone in repair after fracture or operation; the obstetrician, with new possibilities for ante-natal nutritive care for both mother and child; and the physician with his special need of close intimacy with the details of nutritional study. Familiarity with the course of experimental studies in nutrition is no less important to the medical officer or administrator. He is at the opening of a new chapter in preventive medicine, comparable indeed with that opened to his predecessors at the dawn of bacteriology. He has again to learn, as they did, the philosophy of "the infinitely little."

The range and variety of interests served by advances in nutritional science have indeed no visible limits set to them, according to Fletcher. Progress in that service must always gain greatly from the ready and abundant exchange of experience and of ideas. That is what this new publication is designed to promote, and in so far as it attains that end will it deserve praise.

The Word "Cocktail"—A Misnomer

It is of momentary interest that the word "cocktail"—now applied indiscriminately to a variety of sweet, tart, or stimulating concoctions ranging from tepid combinations of jaded fruits to highly seasoned shellfish appetizers or strange and contradictory potations—should have the origin attributed to it by lexicographers. The word has been engagingly discussed in a communication from Arnold Shircliffe, whose collection of early books on cooking and allied interests is one of the largest and most noteworthy in this country.

Early in the seventeenth century certain rustics made a practice of "doctoring up" their old horses temporarily and prancing them before prospective buyers at country fairs in order to make a sale. The term, cocktail, was applied to these horses whose tails were cocked like a cock's tail. The *Oxford Dictionary* defines the word, also, as "a kind of beetle" and "as a person placed above his birth or breeding."

The origin of the word in connection with food or drink has been variously attributed to the United States, yet in a little volume entitled *The Squire's Recipes*, printed by Roger Buck in 1784, we find the following: "A Cocktail. By this curious name the Squire has designed a most delicious drink, the composition of which has long been held secret. That it is of romantic origin, the Squire admits, inasmuch as he secured the recipe straight from Sweet Mistress Peggy Van Eyck, of the inn called the Cock's Tail Tavern, at Yonkers, for reason hereinafter described. As this fair maid was once mixing this potion for her accepted lover, Master Appleton, in order that he might face with proper spirit the ire of her father, her favorite game cock, as if in celebration of the momentous event, crowed lustily and shook himself so vigorously that one of his royal tail feathers floated gently towards his mistress. Seizing the feather, she deftly stirred the glass' contents with it, and thereupon proclaimed the drink a Cocktail, by which term it has since been designated."

It was in the early fifties, during the Gold Rush on the Western coast, that small oysters were served in an extremely hot sauce and gulped down by miners as an appetizer, called a cocktail. About the same time Americans concocted a drink which they called a cocktail. Finally the American housewife, as well as those in charge of public restaurants, used the term for a mixed fruit concoction, or a spiced oyster dish, which they served at the beginning of a meal as an appetizer. Today, for seemingly

inadequate reasons, the term has been applied to more recent additions to the American menu—tomato and sauer-kraut juice.

CURRENT COMMENT

A Study of the Relative Economy of Cured Hams of Different Sizes[1]

Little data is available on the economy of different cuts of meat and to the one who purchases large quantities of meat this is especially important. A study was made by Alice M. Child in the Food Research Laboratory of the Experiment Station, University of Minnesota, on the relative economy of cured hams of the following sizes and average weight: large, 20 pounds; medium, 15 pounds; and small, 9 pounds. Skinned hams, in the large size, were also used.

For all experimental work, corresponding left and right hams were numbered in the cooling room of a commercial packing house and were cured by the sweet pickle cure used by the company. The hams were placed in the cure in given lots, so that the time which elapsed between the placing of the ham in cure and smoke and the delivery was the same in each case. By the above procedure it was possible to control all of the variants except the individual differences in the hams.

The hams were wiped with a damp cloth, weighed, then washed in cold water and wiped dry. They were prepared in regulated ovens, using oven thermometers as an additional check on temperature. Meat thermometers reading from 10°C. to 110°C., and 0°F. to 220°F., were inserted in upright positions in the hams one inch back of and parallel to the aitch bone so that the bulbs reached the center of the hams.

Uncovered broiling pans were used for cooking the large and skinned hams, and uncovered sheet iron dripping pans for the medium and small hams. They were placed in ovens preheated to 125°C (27°F.) and held at that temperature until the interior temperature of the ham reached 70°C. (158°F.).

The cooking losses when roasting meat are designated as evaporation, drippings and total "evaporation loss" (the moisture and any volatile material that comes from the roast in the cooking process). "Dripping loss" is the fat and juices left in the pan after the roast is removed. "Total loss" is the sum of the total evaporation and total dripping loss. The

[1] Published with the approval of the Director as Paper No. 1090, Journal Series, Minnesota Agricultural Experiment Station. The experimental work in this study was done by Myrna Hovlid.

percentage of loss is based upon the weight of the raw cut. The dripping loss is not a real loss as the fat can be used.

Six hams in each group were cooked the average minutes per pound; losses, edible and non-edible, and servings per pound are given in the table. The data show that the minutes per pound for cooking different sized hams varies inversely with the size of the ham, the large ham taking

Comparison of minutes per pound, losses, edible and non-edible portions, and servings of cured hams of different sizes

SIZE OF HAM	AVERAGE WEIGHT	MINUTES PER POUND	LOSSES			PERCENTAGE		SERVINGS PER POUND UNCOOKED HAM
			Evaporation	Dripping	Total	Edible portion	Non-edible portion	
	pounds		*per cent*	*per cent*	*per cent*	*per cent*	*per cent*	
Large	19.38	19.25	10.40	15.54	25.94	58.35	15.71	3.6
Large (skinned)	21.60	15.75	11.82	11.35	23.17	60.72	16.11	4.0
Medium	15.37	21.67	6.24	13.11	19.35	64.79	15.86	5.0
Small	9.82	25.42	7.60	10.63	18.23	63.28	18.49	4.5

the least time per pound and the small the greatest. The skinned ham of approximately the same size as the unskinned required less time per pound. The medium sized ham yielded the highest percentage of edible portion and the large hams the lowest. "Non-edible" portions consisted of skin and bone. The number of servings per pound (approximate serving $5\frac{1}{2}$ x $2\frac{1}{2}$ x $\frac{1}{4}$ inches) were greatest for medium and least for the large size.

BOOK REVIEWS

A Diabetic's Own Cook Book. By Stella H. Lyons. Price $2.00. New York: Alfred A. Knopf, 1932, pp. 90.

In the foreword to this book Dr. Clendening says: "There is no blacker despair than that which settles on a middle-aged epicure's soul when he is told he has developed diabetes. The manuals which scientific doctors prepare for these unfortunates only appear to deepen the gloom." Mrs. Lyons' book is interesting in that it was written by a diabetic layman and fairly represents the usual diabetic's reaction to his disease. The book contains numerous good recipes and may be found helpful to an already well-trained diabetic competent to interpret the suggestions wisely. Certain inaccuracies such as the statement that beets and turnips are 20 per cent vegetables—their greens, 10 per cent—might prove misleading to the uninitiated. Mrs. Lyons' mission as she states it is to "remove that bugaboo, the scales, for the layman who has not the time to study and transcribe measurements."

Some Biting Remarks About You and the Food You Eat. By Happy Goldsmith. Price $.75. New York: A. S. Barnes and Company, 1931, pp. 43.

This is an engaging presentation of the author's own methods—in language and drawings—of driving home nutritional truths to children. It should assist many to answer the questions propounded by youth and to sweeten the pill of learning in an amusing yet forceful way.

The Iron Content of Vegetables and Fruits. By Hazel K. Stiebeling, Bureau of Home Economics, U. S. Department of Agriculture, Circular 205. Price 5 cents.

The author presents, in tabular form, the findings of a series of determinations which show the value for iron of 110 different forms, parts, or varieties of vegetables and fruits which commonly enter into the American diet. The results are also summarized in a list classified according to iron content as "excellent," "good," "fair," and "poor."

Growth and Development of the Child. Part III. Nutrition. Report of the Committee on Growth and Development, White House Conference on Child Health and Protection, Kenneth D. Blackfan, M.D., Chairman. New York: The Century Company, 1932, pp. 532. Price $4.00.

The results of this study of children's health needs from the standpoint of nutrition involved an examination of information gathered from observation and measurement of many individuals, and from experimentation in the laboratories of Europe, the Orient, and the United States.

The findings are assembled in twenty-two separate topics, among them: "Appraisal of the National Food Supply," "The Vitamin B. Complex," "The Pathology of Vitamin Deficiencies," "Iron in Nutrition," "Growth and Health in Relation to Nutrition," "Dietary Adaptations for Geographic and Racial Factors," and "Psychological Factors in Nutrition." This one volume represents a careful condensation of modern nutrition knowledge linked to the growth and well-being of the child.

Nutrition Service in the Field, Child Health Centers: A Survey. Report of the Subcommittee on Nutrition, White House Conference on Child Health and Protection, Lucy H. Gillett, Chairman. New York: The Century Company, 1932, pp. 139 and 57, Price $2.00.

This volume gives one a comprehensive picture of the types of persons and groups now interested in nutrition work for children, with examples of the service now being given by various agencies throughout the country. A major portion of the first section of the

book is devoted to reports from those in charge of these various health agencies, ranging from the Extension Service of the United States Department of Agriculture, The American Red Cross, State, Community Health and Welfare agencies, hospitals and dispensaries, schools and commercial organizations. The book affords remarkable opportunity for detailed information regarding the field work now being done in nutrition.

Fifty-seven pages are devoted to a survey of child health centers in the United States and its possessions, an account of the nature and cope of the work of these centers, with recommendations for improvements.

The Household Searchlight Recipe Book. By Members of the Staff of the Household Magazine, Topeka Kansas. Pp. 289. Price $1.25.

This is a cookbook planned for the average family and based on the expressed opinions of actual homemakers. It contains twelve hundred recipes calling only for ingredients readily available in the average American town. The volume is bound in a waterproof and oilproof cover and is so built as to lie flat when opened at any page. It has a thumb index with the twenty-six groups of recipes noted on the tabs.

Midday Meals for Preschool Children in Day Nurseries and Nursery Schools. By Mary E. Sweeny, Assistant Director, Merrill-Palmer School, and Charlotte Chatfield, Specialist in foods and nutrition, Bureau of Home Economics, U. S. Department of Agriculture, Circular No. 203. Price 10 cents. April 1932.

As the title suggests, the work is intended especially for persons responsible for feeding groups of preschool children one or two meals a day, but should be helpful in meeting the similar questions arising in hospitals and other institutions, and the question of food selection in homes, where groups of young children must be fed. In a pamphlet of 46 pages, the authors devote two-thirds of their space to a tabular showing of the chemical composition of the ingredients of recipes, in calories and in grams of protein, fat, carbohydrate, calcium, phosphorus, and iron. They include also a brief discussion of food standards for children, of factors affecting the child's food intake, such as appetite, food habits, and the mechanical problems involved in the child's manipulation and mastication of his food. Variations in the cost of menus are discussed and examples of high and low cost menus for different months are given.

CURRENT LITERATURE

KATHLEEN M. LEWIS

American Journal of Diseases of Children

Vol. 43, April, 1932

Variations in the composition of milk at four hour intervals during the day and night. B. Nims, I. G. Macy, M. Brown and H. A. Hunscher.—p. 828.

Vol. 43, May, 1932

Daily and monthly variations in milk components as observed in two successive lactation periods. B. Nims, I. G. Macy, H. A. Hunscher and M. Brown. —p. 1062.

* The acid-base metabolism of a normal child on diets that increase in fat content. C. A. Weymuller and S. Ratner.—p. 1092.

THE ACID-BASE METABOLISM OF A NORMAL CHILD ON DIETS THAT INCREASE IN FAT. The acid-base metabolism of a normal boy of nine years who received a ketogenic diet was studied. Three diets were used for four days each. The ketogenic-antiketogenic ratios were 1:2, 1.5:1 and 2.6:1. The basal caloric requirement was increased by 30 per cent. The blood results were similar for the most part to the changes found in children who developed ketosis due to fasting, except for a rise in serum chlorides. Nitrogen equilibrium was maintained only on the first diet. The experiment describes the adjustments made during the transition from an ordinary diet to a ketogenic diet in which the chief event is probably a reduction in the volume of body fluids to a lower level. When this level is reached, the usual relationship of acid-base intake to excretion is approximated. These findings do not justify the inference that this ketogenic régime causes a very great depletion of inorganic substances.

American Journal of Public Health

Vol. 22, April, 1932

Ice cream sanitation and control. F. W. Fabian. —p. 353.

* A basis of rationing for Federal prisoners. P. E. Howe and A. H. MacCormick.—p. 375.

Vol. 22, May, 1932

* A health aspect of frozen vegetables. R. P. Straka and L. H. James.—p. 473.

Judging the efficiency of the enforcement of sanitary milk regulations. J. D. Brew.—p. 514.

Vol. 22, June, 1932

Effect of lead arsenate spray on the composition and vitamin content of oranges. E. M. Nelson and H. H. Mottern.—p. 587.

*Public health aspects of frozen foods. C. R. Fellers. —p. 601.

A BASIS OF RATIONING FOR FEDERAL PRISONERS. It was necessary to have a basis for determining the cost of food, and whether the diet was adequate or not for economical and satisfactory feeding of prison inmates. The data were obtained from five prisons having over ten thousand men daily, by learning the amounts and the kind of foods used in these institutions and modifying the material to meet the requirements for an adequate diet. The study showed three things which seemed advisable to consider in the future: The food should be more palatable so it will appeal to more appetites; more vegetables should be used to provide vitamins and salts and these should be prepared properly to be more appetizing; moreover, the menus should be so planned to insure the proper ratio between calcium and phosphorus.

A HEALTH ASPECT OF FROZEN VEGETABLES. With the increased demand for frozen fruits and vegetables in the last twenty years, there has arisen an important food problem, that is, the possibility of botulinus poisoning resulting from improper handling of the defrosted foods. The method of preparing the food for storage and the proper treatment during the defrosting period are being carefully considered by those interested in furthering the growth of the frozen food industry. An

experiment was carried on to determine the effect of freezing temperature upon botulinum spores and whether the micro-organism would produce toxins when deforsted under varying conditions. Peas were inoculated with botulinum spores, frozen and defrosted by four methods: testing immediately after defrosting; holding in a refrigerator three and a half days; holding at room temperature three and a half days; and boiling in a water bath of brine for ten minutes and then storing in jars at room temperature for three days. Toxins were formed only in the peas which were defrosted and held at room temperature for three and a half days, thus indicating the result of keeping defrosted foods at room temperature for that period of time.

PUBLIC HEALTH ASPECTS OF FROZEN FOODS. The frozen food industry, formerly of small importance, is experiencing a tremendous growth. Consumers are beginning to realize the economical, sanitary and satisfactory results of perishable products which have been preserved in this manner. Factories for freezing food, which have been studied in different parts of the country, indicate that if the raw product is of a high quality, carefully prepared, frozen rapidly and kept at a low, constant temperature, it will at the end of the process be as attractive in appearance, have the same nutritive value and quality as before preservation. The chemical, enzymic and nutritive properties change very little in the freezing process, and it is certain that the number of micro-organisms is greatly decreased. Greater safety will be assured when the length of time, and the temperature at which the various frozen foods may best be kept, is determined by the shopkeeper and the consumer.

American Restaurant Magazine

Vol. 15, April, 1932

Some sidelights on the menu. H. Ewing.—p. 36.
Market conditions. H. R. White.—p. 38.
*Shrinkage as a profit factor in meat cookery. I. Willson.—p. 39.

Vol. 15, May, 1932

The ragout and how to make it. H. Ewing.—p. 38.
Market conditions. H. R. White.—p. 46.

Vol. 15, June, 1932

*Lighter foods for summer menus. H. Ewing.—p. 27.
Market conditions. H. R. White.—p. 40.

SHRINKAGE AS A PROFIT FACTOR IN MEAT COOKERY. Losses in roasts are of two types: (1) Evaporation due to moisture and other volatile substances and (2) dripping loss, the fat and liquid in the pan. Roasts in which the losses are great, pull away from the bone and shrink into a more compact mass.

There are two controllable factors which have been shown to affect the amount of shrinkage in meats: (1) The degree of doneness, and (2) the oven temperature used for roasting. The well done roast will have about 6 per cent greater shrinkage. The higher oven temperature will give about 10 per cent greater shrinkage.

LIGHTER FOODS FOR SUMMER MENUS. In summer we turn to lighter foods which are more easily digested and have fewer calories; yet one must be satisfied. Chop suey may be made famous if all the flavors are carefully blended. The vegetables contribute greatly to the fragrance and are responsible for the ease with which the food is digested. Lobster timbales are very light and delicate. Braised sweetbreads in combination with macaroni are filling, satisfying and delicate.

Archives of Pediatrics

Vol. 49, April, 1932

*Irradiated milk, the new rickets prevention therapy. E. B. Hardisty.—p. 236.
Scurvy in a breast fed infant before three weeks. A. L. Hill.—p. 251.

Vol. 49, May, 1932

Intestinal disturbances in infancy due to allergy. C. M. Pounders.—p. 314.
*Value of properly modified powdered milk in infant feeding. H. R. Litchfield.—p. 327.

IRRADIATED MILK: THE NEW RICKETS PREVENTION THERAPY. Due to the disagreeable taste and odor of cod liver oil, it has not been universally administered by mothers or nurses; often the infant is deprived of the help that it would be given by the antirachitic agent. When the rachitic factor is included in the food of the infant, it is not

neglected or omitted. Irradiated milk must be activated under controlled conditions. There must be uniformity of irradiation.

Correctly irradiated milk undergoes none of the adverse effects such as change in taste and odor which is found in milk which has been exposed for a long period of time. Irradiated milk is now being commercially produced and is of standard quality and uniformity.

The incidence of rickets would be, it seems, appreciably decreased if all milk given to babies were irradiated.

VALUE OF PROPERLY MODIFIED POWDERED MILK IN INFANT FEEDING. The increased use of powdered milk in the field of infant feeding stimulated the analysis of the results of breast and artificially fed infants. Lactogen (a spray dried cow's milk modified by the addition of milk fat and milk sugar) was used for the experiment. The powdered milk chosen for the study was certified as to its purity, cleanliness and freshness, and uniformity of its ingredients.

Lactogen was given to 84 new-borns as routine feeding, instead of plain water, within 18 hours after birth; 151 cases in the outpatient clinic were successfully fed on lactogen (at end of six months) out of 163. As a result of this extensive test, there is proof that lactogen can be used in place of fresh whole milk very successfully in infant feeding and for the supplementary feedings of the new-born.

Hospital Management

Vol. 33, April, 1932

A purchasing system for small hospitals. S. M. Bergman.—p. 48.
Should nurses or dietitians serve trays? M. McGovern.—p. 66.
Who should direct hospital food service.—p. 72.
Illinois state institutions adopt cafeteria plan. A. L. Bowen.—p. 74.
A survey of 12 dietetic courses. M. D. Marlowe.—p. 78.

Vol. 33, May, 1932

What's your per capita cost. M. O. Foley.—p. 28.
What's wrong with food service in the south. F. T. Proudfit.—p. 66.
Feeding 132 children, 120 personnel. D. Goodrich.—p. 76.

Vol. 33, June, 1932

You can't run a dietary department entirely on reports. W. M. Meyer.—p. 58.
Who should be manager of the dietary department. R. Hinyan.—p. 60.
Problems of the out-patient dietitian. Z. L. Kester.—p. 64.
What doctors and research workers know about tomato juice. W. H. Eddy.—p. 66.

Hotel Monthly

Vol. 40, April, 1932

Winged and 4 footed game. A. Shircliffe.—p. 46.
Menu for a game dinner.—p. 48.

Vol. 40, May, 1932

Menus from standpoint of cost. R. M. Grinstead.—p. 38.
Poultry information. A Shircliffe.—p. 53.

Journal of the American Medical Association

Vol. 98, April 9, 1932

Dried lactic acid milks as a long continued diet for infants. J. H. Hess, I. McK. Chamberlain and L. S. Robins.—p. 1250.
*The vitamin content of medicinal cod liver oils and related products. E. M. Nelson and R. Walker.—p. 1263.
*Lower fat diet in diabetes. J. H. Barach.—p. 1265.
Raw versus pasteurized milk. Editorial.—p. 1305.

Vol. 98, April 23, 1932

*Recent advances in the knowledge of scurvy and the antiscorbutic vitamin. A. F. Hess.—p. 1429.
Hyperinsulinism. L. G. Heyn.—p. 1441.
Hypersensitiveness to own breast milk. W. W. Duke.—p. 1445.

Vol. 98, April 30, 1932

Diabetes mellitus appearing in a child within one month after recovery from acute poliomyelitis. E. R. Baisdell.—p. 1549.

Vol. 98, May 7, 1932

Parenteral liver therapy in the treatment of pernicious anemia. M. B. Strauss.—p. 1620.
*Treatment of pernicious anemia with horse liver extract. O. Richter, A. E. Meyer and A. C. Ivy.—p. 1623.
The dietary treatment of psoriasis. J. F. Schamberg.—p. 1633.
*Need of larger doses of viosterol in severe rickets. M. Jampolis and S. Londe.—p. 1637.
The calcium in cheese. Editorial.—p. 1657.

Vol. 98, May 14, 1932

Treatment of older diabetic patients with cardiovascular disease. S. Strouse, S. Soskin, L. N Katz and S. H. Rubinfield.—p. 1703.

Vol. 98, May 28, 1932

*Laxative effects of wheat bran and washed bran in healthy men. G. R. Cowgill and W. G. Anderson.—p. 1866.

Vol. 98, June 4, 1932

*Vitamin A. L. B. Mendel.—p. 1981.
Nutrition and milk production. Editorial.—p. 1992.

VITAMIN CONTENT OF MEDICINAL COD LIVER OIL AND RELATED PRODUCTS. Vitamin assays of 128 commercial medicinal cod liver oil products were made, and included cod liver oils, tablets, capsules, emulsions and miscellaneous products. Cod liver oils are uniform in vitamin D potency, while vitamin A potency is much less uniform unless special precautions are used. Action has been taken by the Pure Food and Drug Administration on all products which do not contain the prescribed dose of vitamins D and A, comparable to a good grade of cod liver oil.

LOWER FAT DIET IN DIABETES. 150 diabetic patients treated with lower fat and higher carbohydrate diets required no more insulin and in many cases less. The patients are better satisfied with higher carbohydrate and lower fat diets and have less desire to overstep their diet. Experiments show that a patient tolerates carbohydrate better than fat. Carbohydrate puts less strain on the metabolism and lessens the danger of coma.

RECENT ADVANCES IN THE KNOWLEDGE OF SCURVY AND THE ANTI-SCORBUTIC VITAMINS. Lack of vitamin C has been proved responsible for early lesions of the teeth (Hoefn of Stockholm—1924). Wolback and Howe believe changes in the epithelium of the blood vessels are due to lack of this anti-scorbutic vitamin. It has also been associated with degenerative changes of the peripheral nerves by Meyer and McCormack. Other infections have been thought to be a result of the lack of this vitamin, namely, furunculosis, nasal diphtheria and grippe.

Very recent work on the potency of vitamin C includes assumptions that it has different degrees of strength in the same food, and that its presence in milk depends upon the fodder of the cow.

This vitamin has been chemically analyzed, and Rygh of Uppsala has isolated and synthesized it from orange juice. It has been found identical with hexuronic acid by King and Waugh. Other work by McCollum disproves the theory that vitamin C is responsible for scurvy. He believes certain metabolic disturbances are directly connected with the disease.

TREATMENT OF PERNICIOUS ANEMIA WITH HORSE LIVER EXTRACT. Typical cases of pernicious anemia were treated with horse liver extract prepared from the livers of healthy United States Government inspected horses. A fraction soluble in 70 per cent alcohol was used in amounts equal to 240 grams liver per day.

Controls were given cattle liver extract in equivalent amounts and a reticulocyte count was made from one to five day intervals, also a complete blood examination every five days.

The horse liver extract yielded a better reticulocyte response as well as a more rapid increase in red cells and hemoglobin.

THE NEED OF LARGER DOSES OF VIOSTEROL IN SEVERE RICKETS. Two brothers suffering from severe rickets (osteomalacia type) were studied over a period of eight months in a hospital, and four months in the outpatient department. One received gradually increasing doses of viosterol and the other, gradually increasing amounts of 10 D cod liver oil with viosterol.

It was found necessary to give the first child ten times the dosage of viosterol usually advocated for treatment of rickets; then, only, was there any response. The child receiving the 10 D cod liver oil with viosterol showed no improvement until an amount of irradiated ergosterol equivalent to 5 cc. of viosterol in oil 250 D was added to the dosage. Marked improvement was seen when viosterol (20 cc. in oil) was given. At no time during the experiment were toxic symptoms noticed.

The use of large amounts of irradiated ergosterol is not advocated, but they are sometimes necessary and are harmless.

LAXATIVE EFFECTS OF WHEAT BRAN AND WASHED BRAN IN HEALTHY MEN. Three series of experiments were made on healthy men to study the laxative value of whole wheat bran, and the results were compared with those of a bran from which the phytin had been removed by weak acid. No difference was found, therefore, the laxative effects of bran are due to its fiber content and not to the extractable phytin. The data supports the view that there is a definite relationship between the rate of laxation and the amount of fiber ingested. An intake of 90–100 milligrams per kilogram of body weight per day facilitates satisfactory laxation.

VITAMIN A. Vitamin A occurs principally in fats—butter, cream, cod liver oil, eggs, and in carrots, spinach and watercress, all of which with the exception of cod liver oil contain carotin, a yellow pigment. Although not a fat, its solubilities correspond to those of fats. It can be destroyed by oxygen and oxidizing agents, but withstands modern methods of food preservation and preparation. Vitamin A can be stored, but because it cannot be synthesized by the animal organism, must be supplied. It can be utilized by parenteral administration, so digestion through the alimentary tract is not necessary for its absorption and digestion. Small doses of carotin have cured rats exhibiting symptoms of avitaminosis due to lack of vitamin A; thus, although carotin and vitamin A are not identical substances, the pigment can be converted into, and stored as vitamin A in the animal organism.

Journal of Biological Chemistry

Vol. 46, April, 1932

A study of certain metals in the prevention of nutritional anemia in the rat. J. M. Orten, F. A. Underhill and R. C. Lewis.—p. 1.

The antineuritic vitamin. Removal of impurities by oxidizing agents. R. J. Block and G. R. Cowgill. —p. 127.

*Vital need of the body for certain unsaturated fatty acids. Experiments with fat-free diets in which sucrose furnishes the sole source of energy. H. M. Evans and S. Lepkovsky.—p. 157.

The sparing action of fat on vitamin B. The rôle played by the melting point of unsaturation of various fats. H. M. Evans and S. Lepkovsky. —p. 165.

The sparing action of fat on vitamin B. The rôle played by glycerides of single fatty acids. H. M. Evans and S. Lepkovsky.—p. 179.

Crystalline vitamin D. C. E. Bills and F. G. McDonald.—p. 189.

Vol. 46, May, 1932

The antirachitic activation of ergosterol in the absence of oxygen. H. H. Beard, R. E. Bunk, H. E. Thompson and H. Goldblatt.—p. 307.

*The relation of glycogen to water storage in the liver. H. L. Puckett and F. H. Wiley.—p. 367.

The relation between glycogen and water storage in the liver. E. M. MacKay and H. C. Bergman. —p. 373.

*Further evidence for the existence of a third vitamin B growth factor for the rat, probably vitamin B_4. N. Halliday.—p. 479.

Studies on iron metabolism and the influence of copper. H. M. Josephs.—p. 559.

Vol. 46, June, 1932

Factors in food influencing hemoglobin regeneration. Whole wheat flour, white flour, prepared bran and oatmeal. M. S. Rose and E. McC. Vahlteich.—p. 593.

Studies in the physiology of vitamins. The acid-base balance of the blood during lack of undifferentiated vitamin B. E. Burack and G. R. Cowgill.—p. 673.

Galactose tolerance of normal and diabetic subjects, and the effect of insulin upon galactose metabolism. J. H. Roe and A. S. Schwartzman.—p. 717.

VITAL NEED OF THE BODY FOR CERTAIN UNSATURATED FATTY ACIDS. Recent studies have demonstrated the physiological importance of fats to the animal organism. Progress can be made only when individual fatty acids are used. Experiments showed that rats receiving the glycerides of saturated fatty acids as the sole source of energy were distinctly inferior to those receiving sucrose, unless unsaturated fatty acids were present in the diet. When diets carry glycerides of saturated fatty acids as the sole source of energy, approximately one-third of the animals succumb before the 50th day of life. In the surviving group an average attainment of 75 to 90 grams of body weight results; normal growth was at no time obtained. Oleic acid, freed of double bond fatty acids, produces a very slight response, whereas lineoleic acid produces a marked response.

THE RELATION OF GLYCOGEN TO WATER STORAGE IN THE LIVER. Experiments were made on albino rats, subjecting them to vari-

ous dietary procedures in order to vary the glycogen content of the liver. The percentile water content was found to be constant regardless of the glycogen present, except in one case in which the fat content of the liver was high. For every unit of weight the glycogen contains an amount of water equal to that held by the non-carbohydrate solids. This value was found to be 24 grams of water per gram of glycogen. In the study of water balance, any changes in the glycogen content of the liver should be considered as a possible site for the retention of water, or as a source of water to be excreted when liberated by the destruction of glycogen.

FURTHER EVIDENCE FOR THE EXISTENCE OF A THIRD VITAMIN B. A group of three rats was used. The first animal received a small portion of skim milk powder during the experimental period and lost weight until whole wheat was added resulting in rapid gain in weight. When the supplements were withdrawn, polyneuritis symptoms appeared. Skim milk improved the condition, but growth was not resumed until whole wheat was added.

The second animal received a protein free milk preparation. There was a rapid growth at first, followed by a long period of weight maintenance until whole wheat was added; then there was a rapid gain.

In the third animal, after polyneuritis occurred, whole wheat was fed, and then "the activated solids" were fed demonstrating the importance of the two materials. Some of the symptoms previously considered as typical of vitamin B_1 deficiency in rats were in reality due to a lack of vitamin B_4. Skim milk apparently contains a small amount of B_4, because the dosages were increased beyond its power to cure polyneuritis, and only the addition of whole wheat relieved all abnormalities and stimulated the appetite.

Journal of Home Economics

Vol. 24, June, 1932

*Tricky labels on foods. S. R. Barber.—p. 502.
Regulating roadside markets. C. B. Sherman.—p. 511.

TRICKY LABELS ON FOODS. The federal food and drug act and various food laws require that correct labels showing the real nature of the product be used on foods which are artificially colored, as well as imitation products. Some manufacturers believe that certain required statements stigmatize their foods, so they make declarations as inconspicuous as possible. The labels may be prepared in color shadings to mislead the eye. Decimal fractions, uncommon terms of measurement such as drams are often used. Tricky naming may give a misleading impression of the product. Often designs or pictures construe a false idea as to the place from which the food comes. The food and drug act has no jurisdiction over the press, billboards, car cards and other displays, or by radio.

Journal of Nutrition

Vol. 5, May, 1932

Some effects of restricted protein intake on the oestrous cycle and gestation in the rat. H. R. Guilbert and H. Goss.—p. 251.
*The value of some vegetables in nutritional anemia. H. Levine, F. B. Culp and C. B. Anderson.—p. 295.
The relative quantities of the heat stable and heat labile fractions of vitamin B in raw and evaporated milk. L. T. Samuels and F. C. Koch.—p. 307.

THE VALUE OF SOME VEGETABLES IN NUTRITIONAL ANEMIA. Most studies in this disease have been made with solutions of inorganic salts. Results obtained from the ash of vegetables do not always apply to the whole vegetable, the crude fibre having some influence on the availability of the mineral salts. Therefore the whole vegetable was used in dried form as the use of fresh material was impractical during a long experiment. Rats with nutritional anemia induced by the use of milk diets were used as subjects. The vegetables studied were spinach, lettuce, tomatoes, asparagus, broccoli and turnip greens. All were found to be effective in haemoglobin regeneration and for normal blood building.

Modern Hospital

Vol. 38, April, 1932

Where diets are made both a science and an art. R. A. Tyler and C. W. Munger.—p. 83.

Planning and serving two hundred thousand meals a month. K. A. McHenry.—p. 128.

Vol. 38, May, 1932

Striving for the ideal in food service. F. A. Carmichael.—p. 71.

Assuring a supply of pure milk for patients and personnel. J. A. Tobey.—p. 93.

*Shall the special diet kitchen be eliminated? K. M. Thoma and H. Smith.—p. 134.

SHALL THE SPECIAL DIET KITCHEN BE ELIMINATED. Advances in the knowledge of nutrition have led to an emphasis on the adequacy of the general diet. A therapeutic diet, if to be long continued, must also be adequate. Such diets usually involve a modification in consistency, in the amount of one or more constituents or in caloric content. These may be planned as variations of the regular diet, the changes being prepared in the main kitchen. It is felt that nurses will gain under this system by the realization that all diets must be adequate, and special diets are modifications of the normal. With such a method it is essential that the dietitian have full control of the food preparation and distribution.

Practical Home Economics

Vol. 10, May, 1932

Experiments in the use of wheat as a food. C. C. Greer.—p. 157.

The school lunch as a factor in a health program. M. Westfall and J. Adams.—p. 163.

A cooperative foods course. L. C. Covel.—p. 168.

Vol. 10, June, 1932

Food and good citizens. R. L. Wilbur.—p. 191.

Nutritional needs of the school child. H. C. Sherman.—p. 192.

Optimum nutrition for the school child. E. Oppenheimer.—p. 193.

Optimum nutrition for rural children. M. Birdseye.—p. 193.

Equipment for cafeterias. M. Westfall and J. Adams.—p. 200.

NEWS NOTES

American Dietetic Association, annual meeting, November 7 to 10, Pennsylvania Hotel, New York City. The program chairman, Emma L. Feeney, states that the New York Home Economics Association will have charge of the program of speakers for the Tuesday luncheon. The Pennsylvania Hotel will entertain members at a tea on Sunday afternoon preceding the convention. Pratt Institute will give a tea on Tuesday when it is planned to have police escort en route to Brooklyn. Further details regarding the program of events and list of speakers will appear in the September JOURNAL.

American Home Economics Association. The twenty-fifth annual meeting was held in Atlanta, Georgia, June 20 to 25, 1932. Headquarters were at the Atlanta-Biltmore Hotel. The central theme of the program was "Revaluations in Home Economics." The president of the Association, Miss Frances L. Swain, supervisor of home economics in the Chicago public schools, opened the first general session on Tuesday evening, when President O. C. Carmichael of Alabama College spoke on "Home Economics in Higher Education," and Dr. Willis A. Sutton, superintendent of schools in Atlanta, on "The Place of Home Economics in the Educational System."

Special group meetings provided for the interests of the various divisions of the Association, such as those dealing with family relationships and economics, the house, nutrition, and clothing. Other sessions considered the problems of home economics teachers, extension and research workers, business women, and practical homemakers.

District of Columbia Dietetic Association. The April meeting was held in the new Commerce Building with Mable Ashenfelter and her assistants as hostesses. This was the annual business meeting of the association and the following officers were elected: President, Ruth Atwater, National Canners' Association; Vice President, Blanche Fickle, Gallenger Hospital; Secretary, Mildred Parker, St. Elizabeth's Hospital; and Treasurer, Mable Ashenfelter, Government Cafeterias. After the business meeting members were shown over the building, including the kitchen and dining rooms, auditorium, and secretary's suite. Refreshments were served.

The May meeting was held jointly with the Home Economics Association at the Y. W. C. A. This was a dinner meeting with Dr. Katherine Warner, surgeon of the U. S. Public Health Service as speaker. Her topic was "The Relation of the Home Economics Trained Person to Public Health."

The Association is a member of the District Federation of Women's Clubs and will be represented at their annual meeting at the Mayflower Hotel when Mrs. Hoover will be guest of honor at the luncheon.

Richmond Dietetics Association. At a recent meeting Dr. Forbes, Professor of Chemical Research at the Medical College of Virginia, talked on "Diet and its Relation to Dental Caries." Through the out-patient department, Dr. Forbes has been carrying on experiments with caries and reported on the work done and the results obtained.

The May meeting consisted of a report by Margaret Bock, a student dietitian of the Medical College of Virginia, concerning the work accomplished during the winter and spring with various social agencies of the Richmond Community Fund. This work included talks on normal nutrition, practical suggestions for economy, compiling market

orders, and low cost food budgets and visits to the homes of clients.

The Tri-State Hospital Convention, North and South Carolina and Virginia, was held at the Jefferson Hotel, Richmond, Virginia, May 17, 18, 19. Gertrude Brown was chairman of the committee for the section on dietetics. The exhibits were divided into four groups, administrative, educational, therapeutic and social service. The therapeutic exhibit was compiled by the Richmond Dietetics Association and consisted of graphic displays representing the essential food stuffs necessary for a normal diet; from these groups corrective diets were made up. Twenty therapeutic trays were displayed. Members of the association were in charge of the exhibits during the entire period of the convention in order that any desired explanation or information could be given.

At the Thursday morning session, May 19, Mrs. Mary De Garmo Bryan gave a talk on "Dietitians in the Hospital." This was discussed by Gertrude Brown and Aileen Brown. On her trip South Mrs. Bryan was accompanied by Phyllis Rowe and Kathleen Lewis of Johns Hopkins Hospital. During the short stay at the Medical College they were entertained at dinner by Aileen Brown and her staff. Helen Roll, president of the state association and Gertrude Brown, president of the Richmond association were also present.

The Food Clinic of Pennsylvania Hospital, Philadelphia, held open house on May 11 and 12.

Graduation Exercises of the Army School of Nursing and Graduate Training Courses in Dietetics for Hospital Dietitians, Physiotherapy for Aides, and Occupational Therapy for Aides, were held on May 27 in the Formal Garden of The Army Medical Center, Washington.

The Mid West Hospital Association, comprising Colorado, Kansas, Missouri and Oklahoma met in St. Louis June 2 to 3. Mrs. Lee Shrader, dietitian, Barnes Hospital, spoke on "Efficiency in food service—ward patients."

Minnesota hospital executives met at St. Paul, Minn., on May 23 and 24. W. M. Meyer of Meyer Bros. Food Control System, Chicago, spoke on the "Elimination of Waste in the Dietetic Department of a Hospital." There was also a discussion by Rose Stone, Dietitian, State Sanatorium, Ah-Gwah-Ching.

North and South Carolina and Virginia hospital executives held a joint meeting at the Jefferson Hotel, Richmond, on May 17 to 19. Mrs. Mary de Garmo Bryan, chairman, educational section, American Dietetic Association, spoke on "Dietetics in the Hospital." There was also a discussion by Gertrude F. Brown, chief dietition, St. Luke's Hospital, Richmond, and Aileen Brown, director of dietetics, hospital division, Medical College of Virginia.

Graham Lusk, M.D., professor of physiology in Cornell University Medical College, has been elected a corresponding member of the Prussian Academy of Sciences.

Born to Dr. and Mrs. Joseph T. Murray (Genevieve Clune), 900 Linden Street, Scranton, Pennsylvania, on April 17, 1932, a daughter, Ann Murray. Miss Clune was formerly dietitian at the Hahnemann Hospital, Scranton, and Mercy Hospital, Wilkes-Barre.

Mary Sutherland Taft, 504 North Blakely Street, Scranton, Pennsylvania, died April 10, 1932. Miss Taft was a former dietitian of the Hahnemann Hospital, Scranton, and of the cafeteria of the International Correspondence Schools. She was a loyal member of the Scranton Dietetic Association and will be greatly missed.

The Corn Industries Research Foundation has appointed Stena Marie Holdahl to direct its department of Home Economics, and to carry on work in the field of dietetics and nutrition, according to an announcement

The dilemma of the modern diet

MODERN living conditions are creating a two-edged problem in menus. A recent article* states the case aptly:

"In this age of automobiles and other machines which relieve mankind of much physical labor, there is an inevitable reduction in the amount of energy which a man must ingest daily in order to maintain his body weight. With lowered intake of calories there is a danger that the other nutrients which have been customarily ingested along with the calories will also be reduced.

"It seems likely that mankind will need to give increasing attention to the ash and vitamin content of the diet until new food habits are established which guarantee new supplies of all these dietary essentials.

One ounce of whole wheat bread will furnish 62 vitamin B units, and 100 calories; one ounce of bran suitably prepared for human use, such as has been used in this investigation, will furnish at least 45 vitamin B units with not more than about 30 calories. One ounce will also furnish vitamin B equivalent to that in one very large apple (100 calories) or 5 ounces of orange juice (60 calories). Without adding very greatly, then, to the total calories in the adult diet, bran may contribute appreciably to the vitamin B content."

But vitamin B, important as it is, is only one of the nutrients furnished by Kellogg's ALL-BRAN. This delicious ready-to-eat cereal provides "bulk" to exercise the intestines, and help promote regular elimination. Furthermore, Kellogg's ALL-BRAN supplies twice as much iron as an equal amount by weight of beef liver. In addition, ALL-BRAN contains valuable proteins and other mineral salts, which promote health generally.

Special processes of cooking, flavoring, and crumbling make ALL-BRAN finer, gentler, more palatable. The "bulk" in ALL-BRAN is similar to that in leafy vegetables.

Except in cases of intestinal conditions where any form of "bulk" would be inadvisable, ALL-BRAN may be safely used. Equally delicious as a cereal, or used in cooked dishes. Made by Kellogg in Battle Creek, Michigan.

*_Wheat Bran as a Source of Vitamin B_, by Rose, Vahlteich, Funnell and MacLeod, pages 369-374. J. Am. Dietetic Assn., March, 1932.

made by Doctor H. E. Barnard, Director of the Foundation. Miss Holdahl will establish a laboratory and test-kitchen in the general offices of the Foundation in Indianapolis, where she will coöperate with researches being conducted with particular reference to corn syrup, corn starch and corn oil.

Dr. Herman N. Bundesen, Health Commissioner of Chicago, who is heard over WABC and the Columbia network each Wednesday and Friday evening in the program "Adventures in Health," sponsored by Horlick's Malted Milk, has recently been notified of his appointment as Director of Health for the Century of Progress Exposition of 1933. In announcing the appointment, Rufus C. Dawes, president of the coming Chicago exposition, said: "We know of no one better qualified to undertake the duties of Director of Health of the exposition than Dr. Bundesen, whose record as Health Commissioner of Chicago has brought him outstanding recognition among health officials in America. The American Public Health Association paid a tribute to his ability when it elected him president of the association a few years ago."

"Adventures in Health," has recently been extended to include eleven additional stations of the Columbia network, making 32 stations in all. So widespread has been the listener response that the sponsors, Horlick's Malted Milk Corporation, have extended the contract for another 26 broadcasts. Originally scheduled to end early in May, the series is now being carried through the summer months into the fall.

Speedy and Thorough Dishwashing

How can greasy dishes be washed efficiently when a form of grease is present in the cleaner itself? Absolute freedom from grease is the principal reason that Wyandotte Cherokee Cleaner washes soiled and greasy sufaces more quickly and economically.

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WHO'S WHO IN THIS ISSUE

FLORENCE H. SMITH is Assistant Professor of Nutrition, Department of Medicine, University of Chicago. She was President of the American Dietetic Association, 1927 and 1928, and Editor of the JOURNAL OF THE AMERICAN DIETETIC ASSOCIATION 1925 to 1927. Miss Smith is a member of the JOURNAL Board and of the Association's Investigation Board, in charge of food exhibits and advertising. BERTHA J. BILTZ received her B.S. degree from the Kansas State Agricultural College, 1920, the M.S. degree from the University of Chicago, 1932. She was assistant in the Department of Nutrition at St. Mary's Hospital, Rochester, Minn., 1927 to 1928, and instructor in dietetics, Presbyterian Hospital, New York City, 1929 to 1930.

DOROTHY STEWART WALLER, M.S., University of Michigan, has been Chairman of the Diet Therapy Section of the American Dietetic Association for the past two years. Mrs. Waller is President of the Michigan State Dietetic Association, Acting Director of the Department of Dietetics and Housekeeping, University Hospital, and Instructor in the Department of Internal Medicine, University of Michigan. She is the author of *Table of Nutritive Value of Foods*.

MARY S. ROSE, GRACE MACLEOD, ELLA MCC. VAHLTEICH and ESTHER H. FUNNELL were noted in the March JOURNAL. CATHERINE L. NEWTON is an assistant in the Department of Nutrition, Teachers College, New York City.

SISTER M. VICTOR received her B.S. degree from Teachers College, Columbia University. She is head of the Department of Nutrition, St. Mary's Hospital, Rochester, Minnesota.

MARY M. HARRINGTON, Director of Dietetics, Harper Hospital, Detroit, Michigan, was formerly metabolism and research dietitian at the University of Michigan. Her recent publications include "A Simplified Method of Controlling Diabetes Mellitus" written jointly with Dr. A. C. Curtis; "Appetite in Relation to Weight," "Recipes for Weighed Diets" and "Translating Food Economics into Simple Terms of Service." Miss Harrington is a member of the Committee on Revision of Courses of Study, Education Section, American Dietetic Association.

RUTH ATWATER received her first training in Home Economics at Pratt Institute, Brooklyn, New York. She later taught at Pratt Institute in the Teachers Training Division for a number of years, after which she took her Bachelor's and Master's degrees at Teachers College, Columbia University. At the completion of her work for her Master's degree, she had charge of the Food Department of Skidmore College, Saratoga Springs, New York, for four

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years. During the time that she taught at Pratt, she taught four summers in the Home Economics Division of the University of Chicago. Since 1927, she has been associated with the National Canners Association as Director of their Home Economics Division. Her work is contact work, interpreting the research of the industry to the consumer, to schools and colleges teaching home economics, to women's clubs, the Extension Service, and to any interested organized group. Miss Atwater also writes for professional journals or trade papers and for women's magazines. The National Canners Association is the research and service organization of the canned foods industry. Miss Atwater has prepared a series of pamphlets, especially adapted to the consumer, on various aspects of the canning industry, and there are also two recipe booklets for the use of canned foods in quantity available for her department. These two booklets were prepared by Alice M. Child, Director of the Food Research Laboratory of the University of Minnesota.

ALICE M. CHILD is head of the Foods Section of the Division of Home Economics, University of Minnesota. Miss Child is particularly interested in research work on meat, studying quality, palatability, and best methods of cooking. She is chairman of the cooking committee of a national project, Coöperative Meat Investigations, made up of members of the Bureau of Animal Industry, Bureau of Home Economics, and State Experiment Stations.

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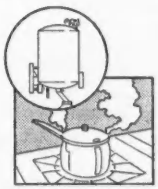

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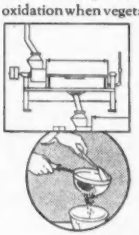

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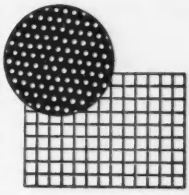

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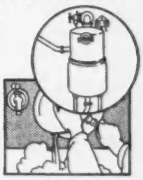

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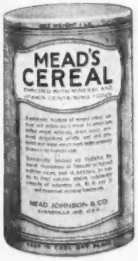

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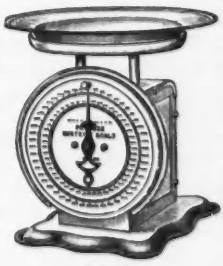

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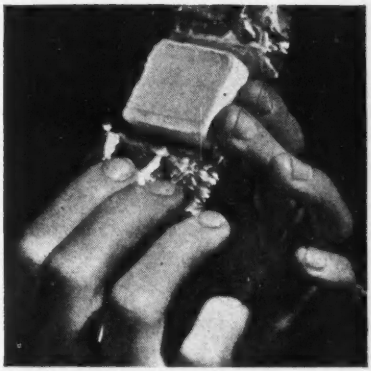

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